INTERNATIONAL
TRADE
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# Smart Cities, Regions & Communities

# EXPORT OPPORTUNITIES

Volume I, Summer 2016

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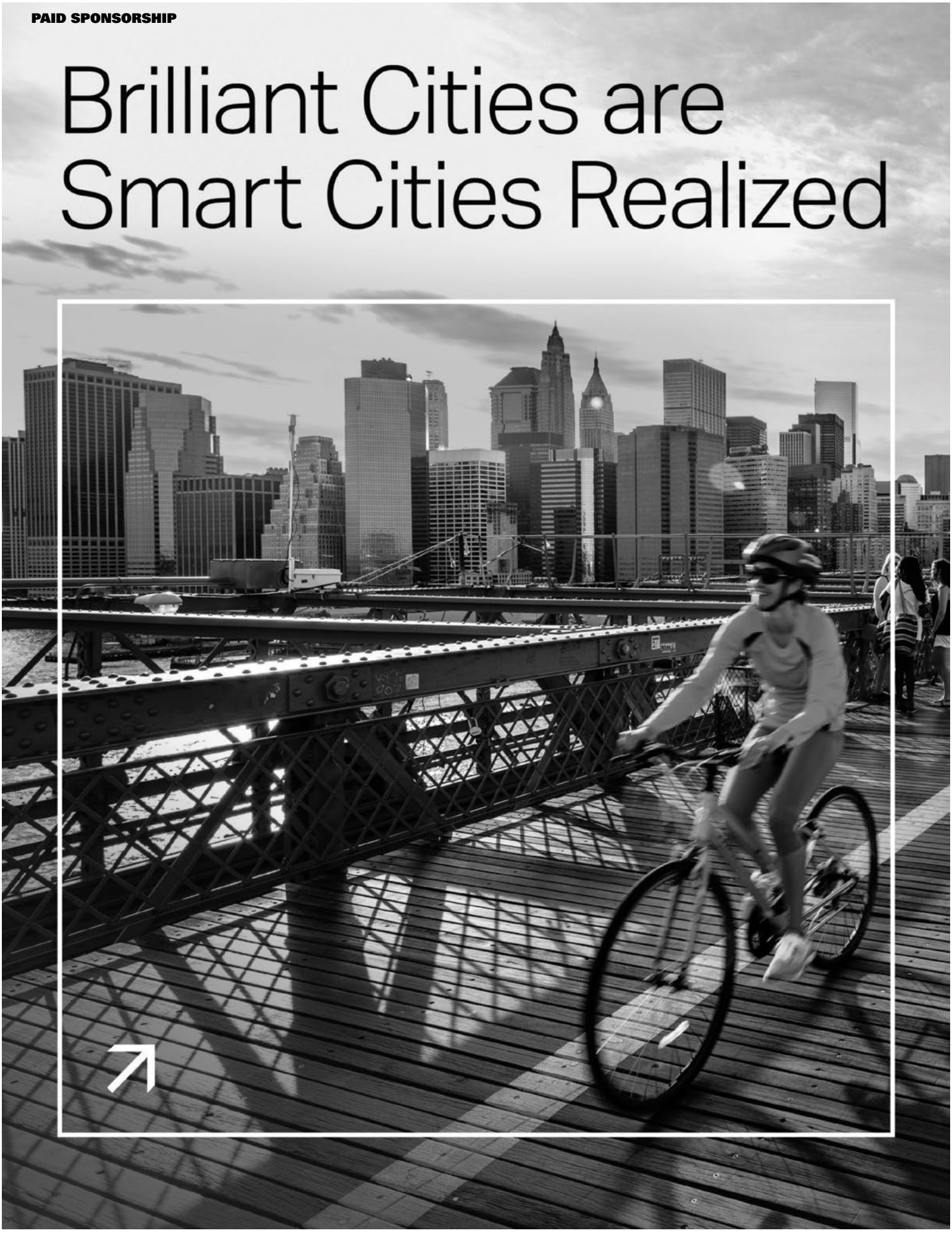
# Brilliant Cities are Smart Cities Realized




# Eight steps to a brilliant city:

**Start at the end:** Secure a legacy with strategic planning.

**Draw a crowd:** Energize the center through compact urban design.

**Get there together:** Upgrade transportation to move people and business faster.

**Change the flow:** Get more from innovative energy and water infrastructure.

**Make green pay:** Take environmental action that provides an economic boost.

**Ignore borders:** Collaborate across agencies and regions for bigger results.

**Act now:** Identify and address physical and cyber vulnerability.

**Finish ahead:** Get projects funded, built and operating sooner.

To learn more about how AECOM's design, build, finance and operate capabilities can help your city go from smart to brilliant please visit:
**www.aecom.com/brilliantcities**

AT&T Smart Cities

# Give your city the power to think

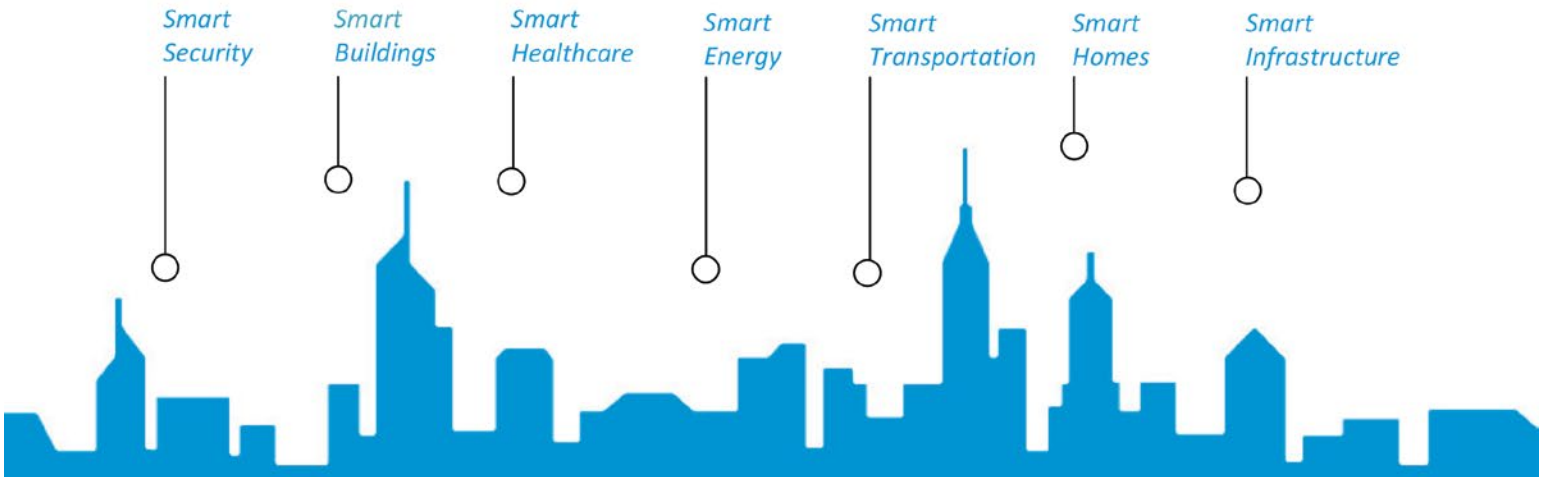
## Solutions for cities tosense and adapt

A city where technology interconnects and nurtures.A place that brings its operationsand living experience to a whole new level.And where city managers can optimize growth, refine budgets, sync resources, and plan proactively.

That's the power of AT&T Smart Cities.Whenassets like street lights, utility meters, water pipelines, transportation systems, and vehicles are connected, you can optimize resources, monitor aging infrastructure, enhance public safety, increase economic development, and help city residents become safer and happier.


## Built-in experience

With more than 135 years of experience with technology innovation, AT&T is a leader in the Internet of Things (IoT) and Machine-to-Machine (M2M) services with over 28 million IoT device connections worldwide.Offering the best global coverage[1] and helping businesses serve customers better with mobility and highly secure cloud solutions, AT&T is active in virtually every major industry including: automotive, healthcare, manufacturing, transportation, supply chain, energy, and municipal infrastructure.




www.business.att.com

www.att.com/iot

[1]Global coverage claim based on offering discounted voice and data roaming; LTE roaming; voice roaming; and world-capable smartphone and tablets in more countries than any other U.S. based carrier. International service required.Coverage not available in all areas. Coverage may vary per country and be limited/restricted in some countries.

# Operate intuitively

## Smart City solutions to power proactive response

### Energy and utilities

AT&T Smart Grid solutions help utilities implement modern grid management using advanced metering infrastructure (AMI) and operational data.By connecting the metering infrastructure, utilities can optimize energy supply and demand.

### Transportation

A clear view of city movement helps manage traffic flow, improve safety, and helps citizens with on time arrivals. AT&T provides a full range of services from automotive to motor-carrier fleet and driver management. Working with 19 of the top global car brands, AT&T is leading the way with more than 8 million connected cars on the network.AT&T Fleet Management solutions help manage asset movement plus labor, fuel costs, scheduling, and dispatch through advanced monitoring tools.

### Water infrastructure and asset monitoring

As a member of the National Institute of Standards and Technology (NIST) Smart Cities Initiative, AT&T Smart Cities and Asset Management solutions are helping smart city projects across the country.Working together with Mueller Water Products and IBM, AT&T helped deliver a commercialized water solution that uses acoustic technology to determine potential leaks in city water systems.AT&T Asset Management solutions help monitor thediagnostics, operations, and condition of the repair equipment.

### Lighting

In collaboration with General Electric, AT&T delivers advanced lighting solutions. This combined solution that includes GE Lighting and AT&T wireless services can enable cities to remotely monitor and control lighting on public roadways.A web-based interface linked to the lighting controls allows municipalities to instantly identify usage and performance of street lights in specific locations.

# Adaptive. Proactive. Agile.

## Strong service foundation that grows with the needs of your city

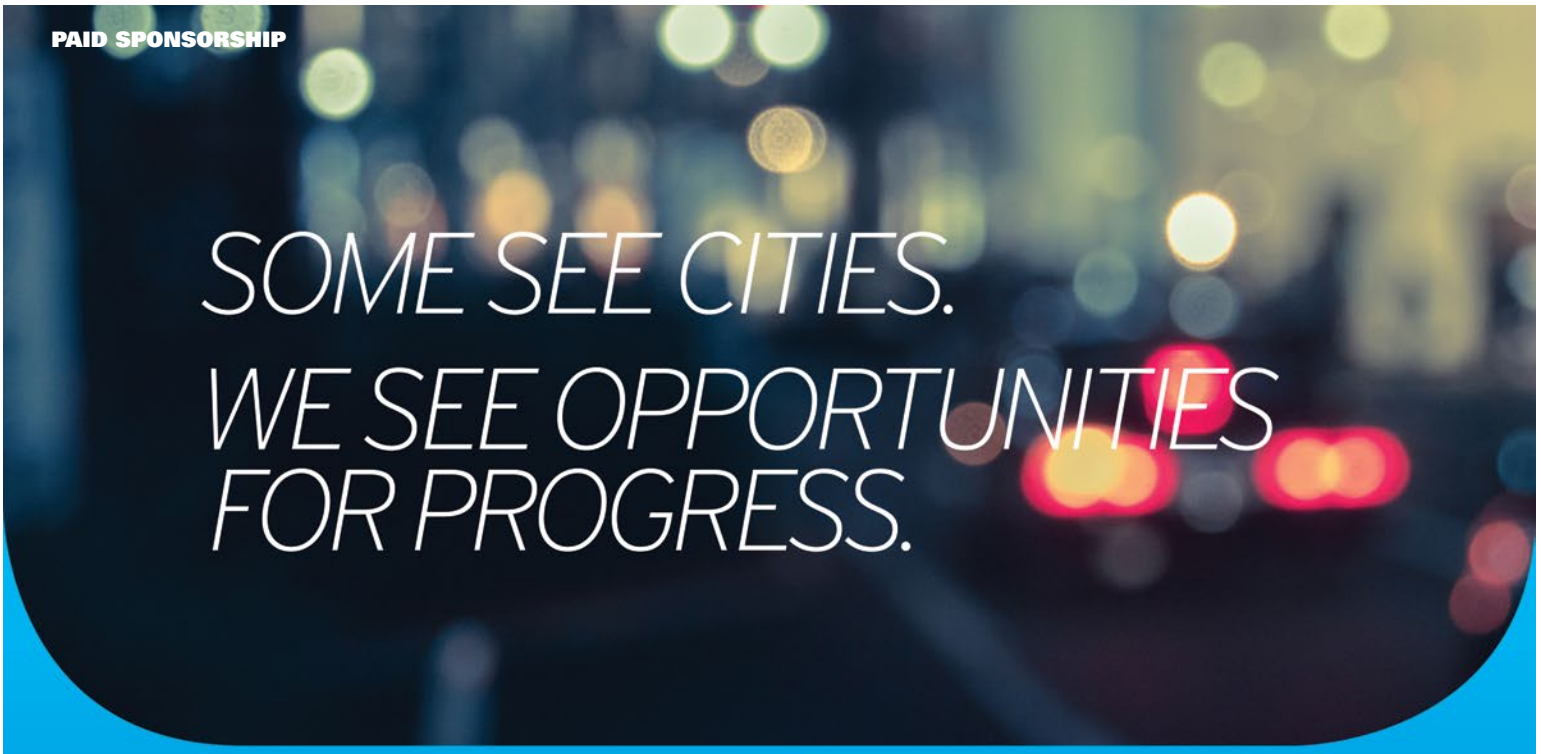
### Global and multi-network communications

Businesses and governments are connecting assets around the globe—even in the most remote areas. That's why AT&T provides a variety of network technologies, so businesses have the agility to choose the right means of communication based on the specific needs and location of their connected machines.Global communications with AT&T includes capabilities in 225 countries and territories operating across more than 500 wireless carriers.In addition, AT&T supports integrated satellite communications for remote assets, low-power networks, mesh networks, and provides access to more than 1 million Wi-Fi hot spots globally through roaming agreements.

### Highly secure connectivity

AT&T excels in the network security of connected devices. Data moving between devices and machines is highly secure with AT&T Virtual Private Network, AT&T NetBond, Commercial Connectivity Service (CCS), and custom, private Access Point Names (APNs).

## Help your city get to the future fast.Learn more at www.att.com/iot.



# SOME SEE CITIES. WE SEE OPPORTUNITIES FOR PROGRESS.

Citi's financial solutions help bring progress to cities around the world. Through our Citi for Cities initiative, we partner with governments, businesses, citizens and community organizations to identify and implement innovative solutions that drive efficiencies, enhance quality of life and ultimately support the growth of cities around the world.

*SERVICES PROVIDED TO MUNICIPALITIES AND AGENCIES:*

***Digitization of services***

- Citi provides cutting-edge online and mobile technology to help cities improve security, increase efficiency of payments and collections, lower costs and ultimately enhance connectivity and convenience for citizens and businesses.

***Financing and advisory***

- Citi's financing and advisory services enable cities to more effectively provide services and pursue projects such as transportation systems, utilities and healthcare networks.
- Tailored financing methods can help cities achieve their goals.

***Efficiency optimization***

- Citi helps cities leverage their spending power, enhance their treasury management and streamline their operations.
- Innovative financial tools can strengthen supply chains, streamline cash management and simplify payments and collections, which improves efficiency, cuts costs and enhances control.

citi®
*The World's Citi®*


# SOLVING PROBLEMS; EXPLOITING OPPORTUNITIES

By 2050, the population of the world's cities will increase by 2.8 billion people to a total of nearly 7 billion, with urban density then exceeding a record of 70% of the world's population. This unprecedented growth in city inhabitants will create urgent issues in energy consumption, waste management, transportation, housing, urban infrastructure, modes of governance, access to education and skills training – and more.

**Global Futures Group (GFG)** recognizes both the challenges and the opportunities that unprecedented urbanization creates. GFG is a driver of change, a vanguard firm providing insights into the realities and possibilities of cities around the world. We identify pressing urban problems and help formulate and implement solutions to enable cities and their citizens to take advantage of the opportunities that a sustainable, livable city can provide.

Contact us at **info@globalfuturesgroup.co** or visit us on **www.globalfuturesgroup.co**

GFG
GLOBAL FUTURES GROUP

# Global Futures Group is organized around four divisions coordinated with one another to maximize impact:

## Consulting

We work with city builders to diagnose problems, fashion solutions, and implement plans to solve them.

## Financial Services

We identify, advise, and invest in high-potential smart city start-ups and high-growth companies.

## Media and Education

We organize and operate smart city convocations, create smart city content for distribution through traditional and digital channels.

## Smart City Foundation

We work with city builders to diagnose problems, fashion solutions, and implement plans to solve them.


Contact us at **info@globalfuturesgroup.co** or visit us on **www.globalfuturesgroup.co**

# TABLE OF CONTENTS



## APPENDIX

# INTRODUCTION

"From the beginning of time, cities have been centers of commerce, formed along the roads and routes of trade. In this way, economies have risen, innovation has flourished, wealth has grown and cultures have evolved."[1] Cities have always been economic growth drivers for their countries. 55% of the world live in urban areas producing greater than 70% of global GDP, and this is only set to increase.

Cities, as magnets of opportunity, continue to draw people from rural areas. The forces of urbanization are disrupting traditional cities and placing new demands on municipal governments. Local leaders are striving to provide secure, efficient and effective basic services (water, energy and transportation, and connectivity). In doing so, they hope to spur economic growth and provide opportunities for citizens to prosper.

During our first two years as Obama Administration officials in the International Trade Administration of the U.S. Department of Commerce, we've seen these challenges in cities of all sizes, from Rome to Riyadh, Nairobi to New York, Jakarta to Johannesburg, Lagos to Los Angeles. Each city is tackling urban challenges with unique solutions in order to spur economic growth for the benefit of its citizenry and the success of the city.

**One** key thread driving these cities forward has been the increased use of technology, specifically, **unlocking, analyzing** and **using data** gathered through the advent of the Internet of Things (IoT). "IoT is based on the fact that everything will be connected to each other, i.e. multiple objects and devices working in tandem to seamlessly deliver solutions and services. To see this vision become a reality would require every single IoT device and object, be it a phone or a traffic light, to be synced to each other, regardless of the manufacturer in question, or the various entities involved in the IoT ecosystem."[2]

This is what's come to be known as *smart* cities – cities aiming to become more energy efficient, clean and green, while addressing Citizen engagement, governance and critical needs in education and healthcare.

After the transformations enabled by electricity and modern transportation, this new era of leveraging information is the next big historical change for cities.

Cities will typically need help at the national level as many of the larger smart infrastructure projects are cross-sectoral and require significant financing, a key challenge in this smart city-smart infrastructure space.

This guide will showcase U.S. Government initiatives, specifically within the U.S. Department of Commerce to inform and assist U.S. companies to play a greater collaborative role in helping global cities address their urbanization challenges.

Recently, the White House announced an investment of over $160 million in federal research to leverage more than 25 new technology collaborations to help local communities tackle key challenges such as reducing traffic congestion, fighting crime, fostering economic growth, managing the effects of a changing climate, and improving the delivery of city services. This new initiative is part of the Obama Administration's overall commitment to target federal resources to meet local needs and support community-led solutions. Further details can be found in the *Technology and Future of Cities* report.[3]

[1] http://www.brookings.edu/blogs/up-front/posts/2011/10/20-global-cities-katz

[2] http://www.forbesmiddleeast.com/en/news/read/2016/iot-is-catching-up-steadily-as-gcc/articleid/10446

[3] https://www.whitehouse.gov/sites/default/files/microsites/ostp/PCAST/pcast_cities_report___final_3_2016.pdf

At the Commerce Department, we have numerous initiatives across our bureaus, to aid U.S. companies and U.S. cities; details are provided in Appendix A.

- **Census Bureau:** The Census Bureau has developed an open data software development kit (SDK) to enable a community, public, or private sector individuals and organizations to more easily extract value from Census data through user-friendly Application Program Interfaces (APIs). Through the SDK we are aiming to provide a user friendly "Toolbox" for civic hackers to connect local and national public data in order to facilitate innovative solutions for our communities.
- **Economic Development Administration (EDA)**: EDA promotes the development of Comprehensive Economic Development Strategies (CEDS) that help cities identify their core economic drivers and build regional cluster strategies.
- **National Institute of Standards and Technology (NIST):** NIST runs the Global Cities Teams Challenge that brings together global city leaders, industry, technologists and academia to solve specific problems.
- Other Commerce bureaus that are engaged with industry and the USG inter-agency to lead in this space include the U.S. Patent & Trademark Office (USPTO), the National Telecommunications & Information Administration (NTIA) and the Bureau of Industrial Security (BIS); their activities are listed in Appendix A.
- **International Trade Administration (ITA):** At ITA we help U.S. industry engage in opportunities and navigate challenges within the smart city/smart infrastructure space globally with trade strategy, promotion services and market intelligence. Additionally, we are engaged with the U.S. Government inter-agency to coordinate on policy and programs. We work with multilateral banks and partners, such as Bloomberg Philanthropies, Brookings Metro, Global Futures Group, Rockefeller's 100 Resilient cities and Smart Cities Council.

We plan to incorporate the USG interagency smart city initiatives and showcase additional U.S. company products and services, in addition to highlighting U.S. company and U.S. city best practices in future versions of this guide. We look forward to your comments and questions; please email the team at smartcities@trade.gov.

**Arun M. Kumar**
Assistant Secretary of Commerce for Global Markets
& Director General of the U.S. and Foreign Commercial Service

**Vinay Vijay Singh**
Senior Advisor, Global Markets,
Urbanization & Infrastructure

As the commercial arm of the U.S. government, the Department of Commerce works to support the American business community by opening and navigating new and existing markets. From collecting weather data, to coordinating commercial activities globally to administering the National Census every 10 years, the Commerce Department 's bureaus has equities across the commercial sphere. To assist U.S. companies in competing for and winning business opportunities in the emerging Smart Cities space, the U.S. Department of Commerce has synthesized the smart city activities of our bureaus into an *Export Opportunities* resource guide. Building on Secretary Pritzker's *Open for Business Agenda*, this guide is designed to further boost U.S. company export opportunities and American job creation by providing insights into new global opportunities and challenges through a deeper understanding of Commerce's current initiatives.

This guide focuses on the global export opportunities and challenges for U.S. companies, large and small, and is a first step towards increased coordination and communication across the U.S. Government in this space. By learning about Commerce's initiatives, U.S. companies are provided with a platform to *engage* with our teams and expand or enter into the myriad of opportunities in the smart city and smart infrastructure space.

## HOW DOES THE GUIDE BENEFIT MY COMPANY?

**Ability to review specific opportunities, initiatives & challenges highlighted across the globe noted within the Trade Promotion and Upcoming Smart Events sections.**

**Increased awareness of financing options for U.S. companies to leverage in their pursuit of global smart cities and smart infrastructure projects in the Access to Capital section.**

**Deeper understanding of the various smart city industry sectors.**

**Engagement platform for U.S. companies through insight into the U.S. Department of Commerce bureau initiatives.**

# HOW IS THIS GUIDE ORGANIZED?

To help maximize the value of this Export Opportunities guide, we've organized the Smart Cities and urbanization activities and resources Commerce has to offer into four key categories, defined below: **(1) Access to Capital, (2) Trade Promotion, (3) Industry Sectors, and (4) Internet of Things.** Supplemental information such as Upcoming Events and U.S. Company and Organization Capabilities is included to provide greater context of the interest and initiatives in this space. This guide is iterative, and we welcome your feedback. Please email smartcities@trade.gov with your comments and questions. Also, feel free to download the latest version of the guide at http://www.export.gov/smartcities.

## ACCESS TO CAPITAL

**The critical challenge for U.S. companies in winning projects in the smart city/smart infrastructure space is discussed in this section. ITA's work with the inter-agency is highlighted along with detailed descriptions of multi-lateral bank initiatives to support U.S. industry.**

## TRADE PROMOTION

**ITA's Global Markets (GM) team highlights 40+ countries in this section, including key smart city country initiatives, featured cities and a calendar of events. U.S. industry can connect with Global Markets U.S. field offices in their area to learn more and consider our Gold Key services to meet with local partners and government officials.**

## INDUSTRY SECTORS

**ITA's Industry & Analysis (I&A) team provides sector intelligence in certain smart city focus areas such as energy, transportation, information and communication technology and standards. The team also provides key challenges and their definition of smart cities.**

## INTERNET OF THINGS (IOT)

**IoT is the foundation for Smart Cities, which use digital technology to improve government services. This section provides a brief description of Bureau activities.**

# URBANIZATION: THE OPPORTUNITY

"Cities around the globe, whether rich or poor, are in the midst of a technology experiment. Urban planners are pulling data from inexpensive sensors mounted on traffic lights and park benches, and from mobile apps on citizens' smartphones, to analyze how their cities really operate. They hope the data will reveal how to run their cities better and improve urban life. City leaders and technology experts say that managing the growing challenges of cities well and affordably will be close to impossible without smart technology. Fifty-four % of humanity lives in urban centers, and almost all of the world's projected population growth over the next three decades will take place in cities, including many very poor cities. Because of their density and often-strained infrastructure, cities have an outsize impact on the environment, consuming two-thirds of the globe's energy and contributing a large share of its greenhouse-gas emissions. Urban water systems are leaky. Pollution levels are often extreme. But cities also contribute most of the world's economic production. Thirty % of the world's economy and most of its innovation are concentrated in just 100 cities. Can technology help manage rapid population expansion while also nurturing cities' all-important role as an economic driver?"[4]

"In the new era for cities, discrete and distinct districts and sub-centers are supplementing historic downtown centers- multiple areas within a city that provide either similar of complementary social and economic functions. Understanding and adjusting tradeoffs between physical and socioeconomic transformations in cities requires well-planned, integrated experimentation and implementation. That is difficult to do city-wide, but districts create the perfect living laboratory. Today, technological implementations provide another path to impact, transforming city districts to become more energy-efficient and green; more convenient, accessible, and conducive to mobility; and more connected and inclusive. These goals are interconnected, and pursuing them jointly through integrated solutions can produce much more livable cities. For example, the use of connected and autonomous vehicles would greatly reduce the need for parking spaces and space dedicated to roads. Freed-up space could enable pedestrian paths, bike lanes, urban farming, and clean urban manufacturing; or it could facilitate change in the density of buildings, which might, in turn, facilitate the deployment of more-efficient energy and water systems, which could lower the cost of housing and help entice people back to the city.

"In recognition of the above, the White House recently highlighted the need for greater U.S. government involvement with the development of Smart Cities. They cited the aforementioned challenges and opportunities for U.S. city residents and business and also touched upon the fact that the rest of the world is not standing still. National governments in the UK, Germany, China, India, Brazil, and Singapore have stepped up with considerable organization and resources to become leaders in urban innovation, positioning their countries and companies for what is now recognized as a multi-trillion-dollar worldwide opportunity. The rewards, they argue, will be largely economic- new products, new companies, and new skilled jobs, which, along with improved urban quality of life, create a virtuous circle that attracts talented new residents and additional businesses from around the world.

"The final recommendation is that the federal government role is appropriate to ensure timely progress in a complicated arena rife with public goods. The role more specifically involves the integration of many technologies, classes of stakeholders, and agency missions; facilitation of demonstration projects of a variety of kinds at district scale; coordination of interagency and public-private R&D investment; facilitation of new

[4] https://www.technologyreview.com/business-report/cities-get-smarter/

standards; workforce development; cooperation with state and local governments; and more."[5]

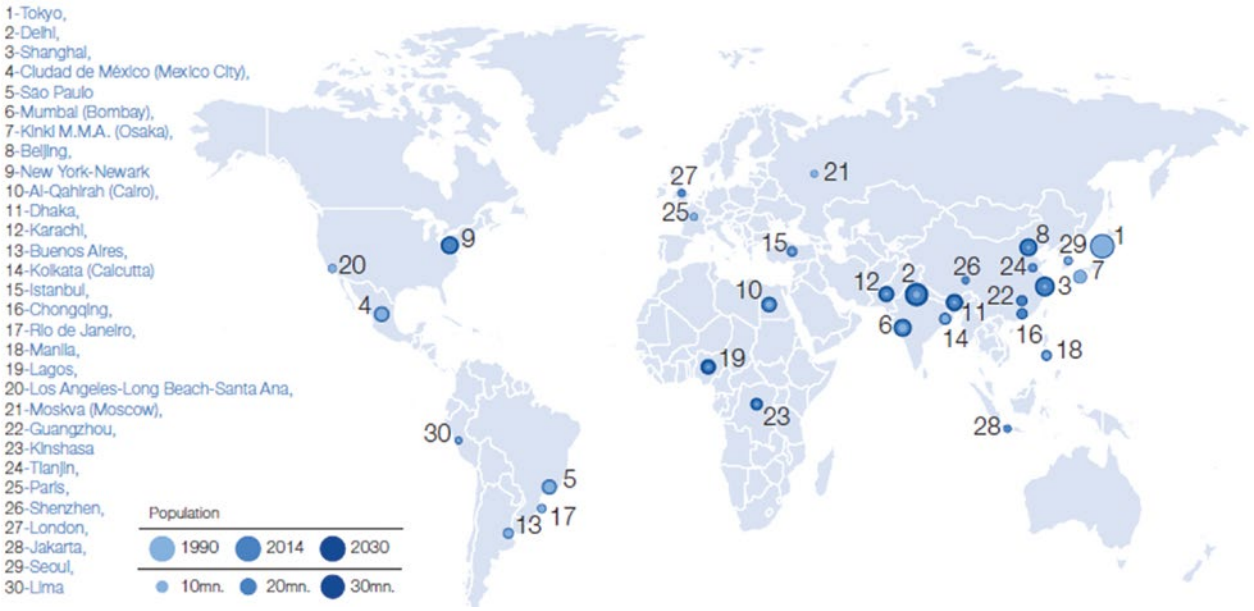
The International Trade Administration (ITA) of the U.S. Department of Commerce has resources to assist U.S. companies as they evaluate global smart city/smart infrastructure opportunities. From our 100+ U.S. Commercial Service offices across the country which provide trade counseling and our 70+ U.S. Commercial Service offices who provide Gold Key services (vetted matchmaking with industry and government) to our valuable Top Markets reports providing market intelligence, our teams are ready to assist you with export opportunities.

"Cities are hubs for ideas, commerce, culture, science, productivity, social development and much more. At their best, cities have enabled people to advance socially and economically. However, many challenges exist to maintaining cities in a way that continues to create jobs and prosperity while not straining land and resources. Common urban challenges include congestion, lack of funds to provide basic services, a shortage of adequate housing and declining infrastructure.

"The challenges cities face can be overcome in ways that allow them to continue to thrive and grow, while improving resource use and reducing pollution and poverty. The future we want includes cities of opportunities for all, with access to basic services, energy, housing, transportation and more. Goal 11 of the UN Sustainable Development Goals is to make cities inclusive, safe, resilient and sustainable."[6]

**Challenges remain** for U.S. exporters in this space, including just defining the phrase *smart city*. However, urbanization is happening. Cities compete for citizens and strive to deepen their economic viability. In this context, the opportunities are abundant, and the International Trade Administration is here to help you navigate the terrain.

## GLOBAL FOOTPRINT – THE 30 MOST POPULATED URBAN AGGLOMERATIONS (AS OF 2014)



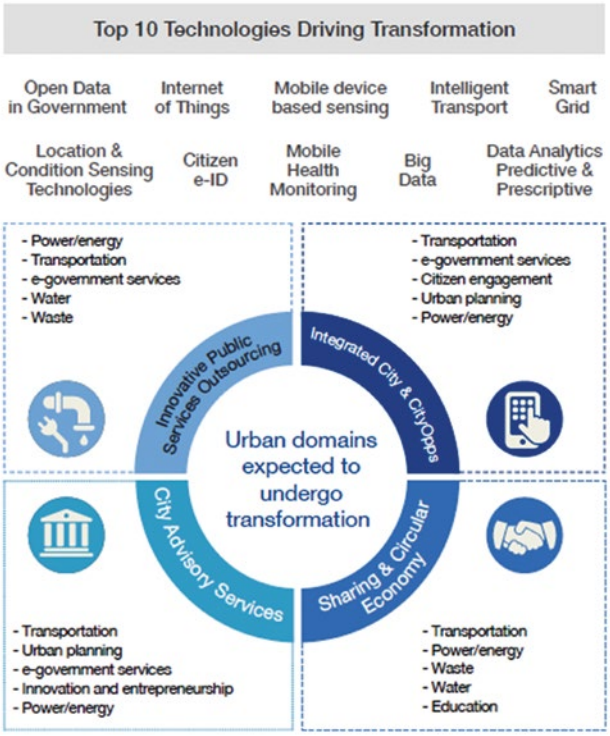

Source: Data from United Nations, Department of Economics and Social Affairs, Population Division. "World Urbanization Prospecs, the 2014 Revision", Highlights, 2014

**"More than 60% of cities**
**that will exist in 2050 have yet to be built."**
http://www.100resilientcities.org/blog/entry/six-big-reasons-we-focus-on-cities#/-_/

[5] https://www.whitehouse.gov/sites/default/files/microsites/ostp/PCAST/pcast_cities_report___final_3_2016.pdf

[6] http://www.un.org/sustainabledevelopment/cities/

## TOP 10 TECHNOLOGIES DRIVING TRANSFORMATION




Source: World Economic Forum, Shaping the Future of Urban Development & Services Initiative, Global Survey on Urban Services (Oct.-Dec. 2015)


**"Cities have become hubs for knowledge-sharing and creativity. More and more people are moving to cities, producing amazing innovations that allow cities to maintain their essential functions despite this constantly increasing population pressure."**

http://www.100resilientcities.org/blog/entry/six-big-reasons-we-focus-on-cities#/-_/

**"Shifting demographics are causing major rebalancing of the engines of global consumption…In the face of this ferment of change, companies need to arm themselves with deep knowledge about the geography of consumers as well as the structural drivers of their spending…"**

http://www.mckinsey.com/global-themes/urbanization/urban-world-the-global-consumers-to-watch

# WHAT IS A SMART CITY?

The phrase "smart city" was coined in the early 1990s to illustrate how urban development was turning towards technology, innovation, and globalization. Cities around the world dedicate resources to redevelop their existing communities, ('brownfield' sites), to connect to other cities (regional development), and to develop new urban sites ('greenfield' sites or planned smart cities).

## FOCUS >>> U.S. BUSINESS COMMUNITY

**At the Department of Commerce, we look to assist U.S. industry as it seeks to build smart cities. It is an opportunity for our teams to especially focus on small and medium sized companies as they navigate global smart city and smart infrastructure opportunities.**

**From technology and data providers, to infrastructure and architecture service companies, to project planning firms, smart urban planning is a key strength of the U.S. industry.**

**Implementing smart urbanization is a critical strategy both in developed and less developed nations. The strategy applies equally to retrofitting existing neighborhoods, cities, and regions as well as a strategy for new growth. In either case, governments will desire to provide efficient, data driven services to their growing populations.**

Simply put, smart cities are defined by its citizens. Whether you call cities, sustainable, shareable, net carbon or democratic, Local and State governments will be responsive to their constituent needs and will prioritize and define their own elements of smartness. Improving the quality of life for citizens, is essential to remain competitive in this globally challenging climate. Ensuring that cities have core economic drivers and can balance safety and security with sustainability will enable their communities to maintain connectivity within their regions and ultimately thrive.

Another approach in defining smart cities is through the lens of city infrastructure technologies as outlined in the recent, *Technology and the Future of Cities* report.[7]

[7] https://www.whitehouse.gov/blog/2016/02/23/pcast-releases-technology-and-future-cities-report-president

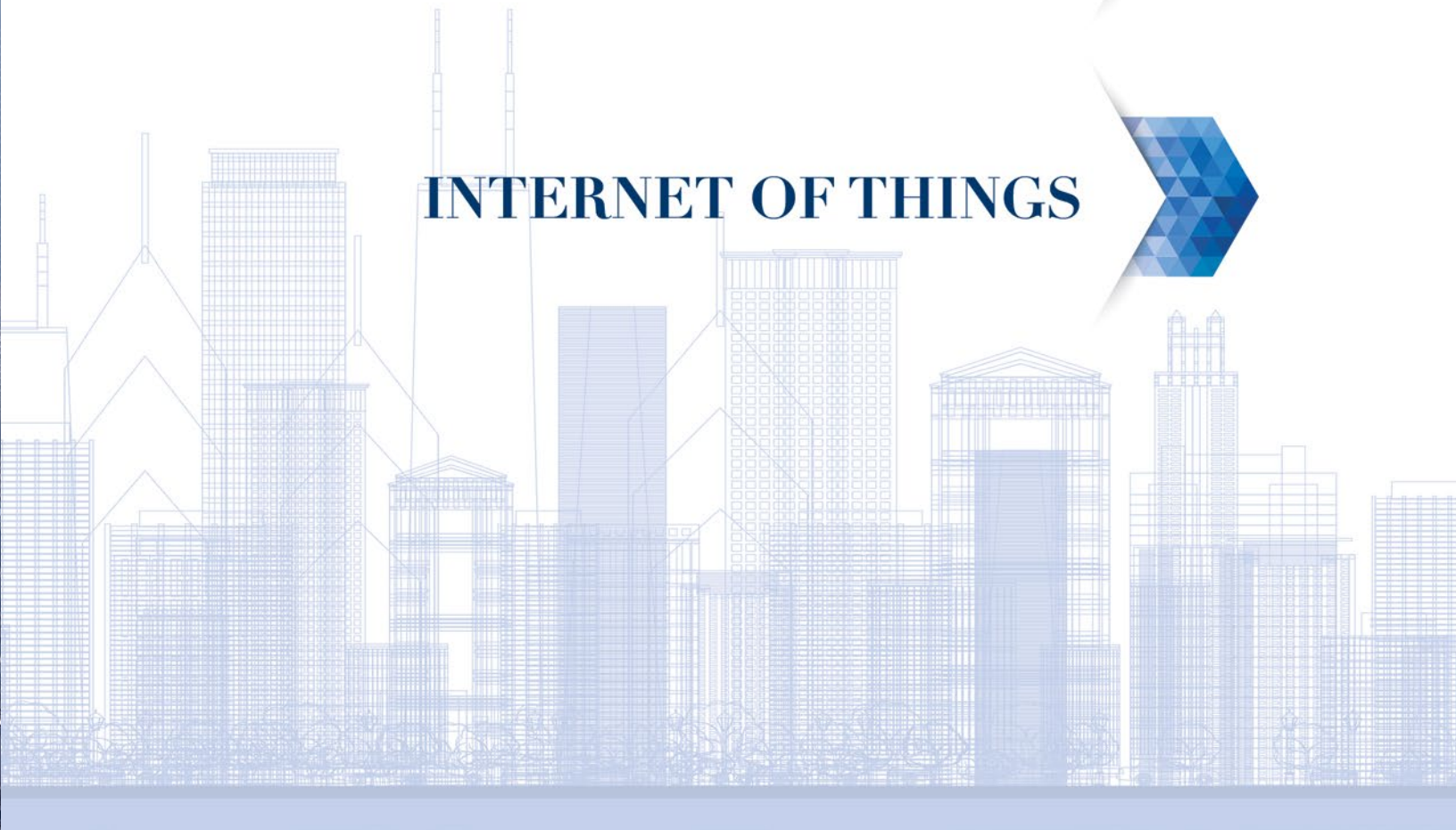
| URBAN SECTOR | TECHNOLOGIES / CONCEPTS | OBJECTIVES |
|---|---|---|
| **Transportation** | Multi-modal integration via ICT applications and models<br>On-demand digitally enabled transportation<br>Design for biking and walking<br>Electrification of motorized transportation<br>Autonomous vehicles | Save time<br>Comfort or productivity<br>Low-cost mobility and universal access<br>Reduced operating expenses to transportation providers<br>Zero emissions, collisions, fatalities<br>Noise reduction<br>Lifestyles<br>Tailored solutions for the underserved, disabled, and elderly |
| **Energy** | Distributed renewables<br>Co-generation<br>District heating and cooling<br>Low-cost energy storage<br>Smart-grids, micro-grids<br>Energy-efficient lighting<br>Advanced HVAC systems | Energy efficiency<br>Zero air pollution<br>Low noise<br>Synergistic resource management with water and transportation<br>Increased resilience against climate change and natural disasters |
| **Building and Housing** | New construction technologies and designs<br>Life-course design and optimization<br>Sensing and actuation for real-time space management<br>Adaptive space design<br>Financing, codes, and standards conducive to innovation | Affordable housing<br>Healthy living and working environments<br>Inexpensive innovation and entrepreneurial space<br>Thermal comfort<br>Increased resilience |
| **Water** | Integrated water systems design and management<br>Local recycling<br>Water efficiency via smart metering<br>Re-use in buildings and districts | Active ecosystem integration<br>Smart integration of water, sanitation, flood control, agriculture, and the environment as a system<br>Increased resilience |
| **Urban Manufacturing** | High-tech, on-demand<br>3D printing<br>Small batch manufacturing<br>High-value added activities requiring human capital and design<br>Innovation parks | New job creation<br>Training and education<br>Urban space conversion and re-use<br>Close integration of living and work |
| **Urban Farming** | Urban agriculture and vertical farming | Lower water use<br>Cleaner delivery<br>Fresher produce |

ACCESS TO CAPITAL

TRADE PROMOTION

INDUSTRY SECTORS

INTERNET OF THINGS



# ACCESS TO CAPITAL

A critical piece of Smart City, Region or Community development relies on project funding and finance. U.S. companies promoting goods or services can turn to Public Private Partnerships, to more traditional financing measures (private capital), the Export-Import Bank of the United States (EXIM Bank), the Overseas Private Investment Corporation (OPIC), the United States Trade and Development Agency (USTDA), or many of the multilateral development banks. We chose to address **'Access to Capital'** first as this topic tends to be at the forefront for U.S. companies and foreign governments.

## OVERVIEW

ITA does not have direct capability to provide financing assistance for Smart City and urbanization activities; **however**, ITA is able to leverage its many relationships in the federal trade and finance community to provide information, guidance, and introductions to assist U.S. companies on the path to acquiring financing.

Recently, the U.S. Trade and Development Administration (USTDA) awarded a grant to a three-company U.S. consortium comprised of AECOM, KPMG and IBM. This grant provides funds for the consortium to provide master planning services to Vishakhapatnam, one of the U.S.-industry-led Smart Cities identified by the Indian government. This approach of seeding master planning of cities is one financing approach for funding Smart City projects.

ITA also hosts roundtables on an ad hoc basis with the private sector and federal partners to discuss Smart Cities and smart infrastructure funding. ITA has also collaborated with a major university to rethink global infrastructure financing, that report is expected later this year.

The private sector will have to drive the financing of smart infrastructure and smart city projects, though local, state and federal governments will continue to play a key role. For smart cities, there are new and old mechanisms being deployed, from crowdfunding community projects, smart incubators and a revitalization of special purpose vehicles, municipal bonds, social impact bonds and public-private partnerships.

In addition to helping foreign governments build capacity and implement appropriate regulatory frameworks, for smart infrastructure, where there can be overlap with larger smart city projects, the Center for Strategic & International Studies (CSIS) recently recommended that "The traditional multilateral development banks (MDBs) should refocus their infrastructure strategies, with an emphasis on effective private-sector engagement and speed without cutting corners."[8]

"In the view of a recent New Cities Foundation report, the most critical infrastructure financing challenges facing cities today are those assets in the public domain (e.g. public transit, roads, water/wastewater treatment) where the public sector is responsible for owning and operating the assets and where financing largely relies on grants, subsidies, taxes and other sources that are unsuitable in the long run.

"Public sector financing is almost always 100 % debt financing. (i.e. fully leveraged with no equity capital at risk). The cost of this debt financing is significantly lower relative to the private sector due largely to taxes and other public assets that effectively serve as collateral on the debt.

"Private sector financing becomes attractive when the public sector is fiscally constrained and facing serious debt capacity issues. Private sector financing is generally perceived to be more expensive because it almost always involves at

[8] https://www.csis.org/analysis/barriers-bankable-infrastructure

risk equity capital. Public-Private partnerships (P3) is a primary infrastructure delivery approach under private sector financing. P3 has been evolving continuously since the 1990's. The key consideration is whether the private sector takes on the brunt of the overall financial risks (revenue-risk model) or the public sector has the ultimate financial liability in the long run (availability payment model). P3 is generally preferred for largescale, capital intensive projects that have long-term strategic importance. Often, private sector financing and delivery can be mired in political controversy. There is sufficient evidence to prove, however, that wider public acceptance is possible if there is a clear mandate on the use of the proceeds to reinvest in infrastructure, credible institutions such as public pensions are involved on the buyer side, and a clear regulatory regime is established to protect social objectives.

In addition to public and private sector financing, International Financing Institutions (IFIs) provide critical financial support in the global infrastructure financing space. IFIs are public sector development and development finance institutions that are owned by one or more national governments. Operating at international, regional, and national levels, IFIs provide a critical nexus between the public policy goals of governments and the international capital markets that allocate financial resources on a global scale.

"For cities that must take on the brunt of infrastructure provision responsibilities in the face of rapid urbanization, innovative ideas in urban infrastructure financing could provide a welcome relief. Several innovative urban financing models and best practices are presented in the recent Handbook on Urban Infrastructure Finance, which include CEPAC Bonds, Crowdfunding for Small Projects and P3 Capital; Local Government Funding Agencies (LGFA); Green Bonds, Carbon Tax, and a Cap-and-Trade for Sustainability; and Social Impact Bonds."[9]

"According to a World Bank report, with fewer options to draw from, cities struggle to overcome barriers related to project economics, and many are not considered creditworthy. That drives up capital costs, if they can get financing at all. Of the 500 largest cities in developing countries, about 4 % are deemed creditworthy by international financial markets, and only 20 % in local ones."[10]

"Other issues raised by various authors include: In cities that lack proper revenue management or expenditure planning, the path to creditworthiness is steep. Some cities, for example, have mandated more spending than they collect in revenue. In one east African capital, fewer than 2 % of properties are registered for tax purposes; it is little surprise, then, that the municipal authorities do not have resources and expertise to plan and manage spending."[11] "Cities in developed countries also face fiscal challenges; a number of American municipalities face ballooning pension obligations and are seeing their credit ratings decline."[12]

"Figuring out how to finance sustainable infrastructure in cities is vitally important. They will continue to be a hub for infrastructure development and carbon emissions, and are often willing and able to take more aggressive action on climate change than national governments."[13]

"Encouraging enough private-sector investment in sustainable infrastructure at reasonable cost will require overcoming or removing five major barriers:

- Lack of transparent and "bankable" pipelines: Even in the G-20, only half the countries publish infrastructure pipelines.
- High development and transaction costs: Thirty % of investments in new clean-energy capacity go to small-scale projects such as rooftop solar; such projects do not naturally generate the economies of scale that can keep costs down.

[9] Kim, Julie, New Cities Foundation (2016), Handbook on Urban Infrastructure Finance [online: http://bit.ly/NCFUrbanFinance]

[10] "Planning and Financing Low-Carbon, Livable Cities," World Bank, September 26, 2013, worldbank.org

[11] "Financing sustainable cities: How we're helping African cities raise their credit ratings," World Bank, October 24, 2013, worldbank.org

[12] Hal Dardick, "Chicago credit rating takes major hit," Chicago Tribune, March 5, 2014, chicagotribune.com

[13] "The State of City Climate Finance: 2015" The Cities Climate Finance Leadership Alliance, December 2015, sustainabledevelopment.un.org

- Lack of viable funding models: Up to 70 % of water provided by utilities in sub-Saharan Africa is leaked, unmetered, or stolen; therefore not enough revenue is generated to maintain or expand the system.
- Inadequate risk-adjusted returns: Investors may be willing to take on sustainable infrastructure but want higher returns to compensate them for the perceived risks. Infrastructure projects are also notoriously prone to corruption, creating significant additional risks.
- Unfavorable and uncertain regulations and policies: Basel III and Solvency II regulations could have the effect of reducing investment in infrastructure at the global level; uncertain tax policies can do the same at the national level. The fact that sustainable-infrastructure projects typically have higher up-front capital costs makes them even more sensitive to the cost and availability of capital.

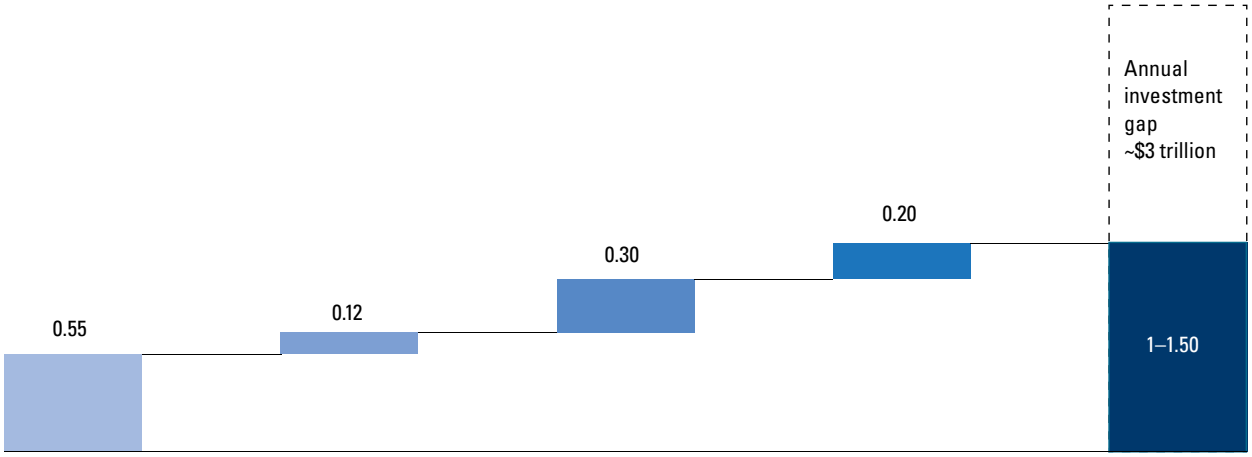
To build sustainable infrastructure on the scale needed, all kinds of investors have to increase the quantity and quality of their financing—the private sector most of all. Right now, private investment accounts for up to half of total infrastructure spending—$1 trillion to $1.5 trillion a year; 65 % to 75 % of that comes from corporate actors, and the rest from institutional investors, such as private equity (PE) and pension funds. Private institutional investors could fill up to half the financing gap—provided that they can identify projects that are bankable and sustainable (Exhibit 1 on next page)."[14] Exhibit 15 from the same McKinsey report highlights the *six actions that have great potential to close the private sector financing gap for sustainable infrastructure.*

Undoubtedly, we will evolve our thinking in this space as we continue to dialogue with the private and public sector. The following pages contain smart city/smart infrastructure offerings and initiatives from several multilateral banks and the U.S. Trade and Development Administration (USTDA).

[14] http://2015.newclimateeconomy.report/wp-content/uploads/2016/01/Financing_change_How_to_mobilize_private-sector_financing_for_sustainable-_infrastructure.pdf

## PRIVATE INSTITUTIONAL INVESTORS COULD FILL UP TO HALF THE FINANCING GAP

**Potential incremental annual spending from private institutional investors,**
$ trillion




[1] Weighted average target allocation = 5.96% across investor groups.
[2] "Reach" allocation defined as 8% weighted average across investor groups.
[3] Assumes 60% of non-infrastructure investors begin investing at level comparable to peer current allocations.

Source: Preqin Infrastructure Online, Funds and Limited Partnership Investors, June 2015

## SIX ACTIONS HAVE GREAT POTENTIAL TO CLOSE THE PRIVATE-SECTOR FINANCING GAP FOR SUSTAINABLE INFRASTRUCTURE

| Barrier | Recommended Action | Actor | Incremental Private Financing for sustainable Infrastructure, 2015-30[1] |
|---|---|---|---|
| **Lack of transparent and "bankable" pipelines** | **1.** Scale up investment in sustainable project preparation and pipeline development | Governments and development banks | $150 billion–$450 billion |
| **Lack of viable funding models** | **2.** Use development capital to finance sustainability premiums | Development banks | $1.7 trillion–$2.6 trillion |
| **Inadequate risk-adjustment return** | **3.** Improve the capital markets for sustainable infrastructure by encouraging the use of guarantees | Development banks | $166 billion–$260 billion |
| **Unfavorable regulatory and tax policy** | **4.** Encourage the use of sustainability criteria in procurement | Governments | $120 billion–$195 billion |
| **High development and transaction costs** | **5.** Increase syndication of loans that finance sustainable infrastructure projects | Development banks | $35 billion–$75 billion |
| | **6.** Adapt financial instruments to channel investment to sustainable infrastructure and increase liquidity | Private sector and international community | $300 billion–$500 billion |

[1] Figures are not directly additive, given that implementing all recommendations could have overlapping impact.
Source: McKinsey analysis

# Asian Development Bank

## SMART CITY OVERVIEW

The Asian Development Bank (ADB) supports smart cities through several regional initiatives and individual projects across Asia and the Pacific. Since the late 1960s, ADB has funded and implemented some 200 urban projects, amounting to more than $20 billion in loans, including urban water supply, sanitation, and wastewater management. In 2012, ADB launched an overarching Urban Operational Plan (UOP) for 2012-2020 which includes projects in clean water, sustainable transport, energy, solid waste management, urban planning and financing sectors.

Implementation of the UOP is divided into three phases:

- Phase 1, 2013–2014 - defined concepts and activities of the UOP initiatives.
- Phase 2, 2015–2017 - will (i) evaluate pilot projects; (ii) prepare project development and implementation manuals for urban initiatives; and (iii) develop partnerships for UOP support and implementation and integrate knowledge generated into peer review processes.
- Phase 3, 2017–2020 – produce knowledge products and outreach materials to plan and develop green, competitive, and inclusive cities; and to upscale investments.

The UOP integrates urban planning through a 'GrEEEn Cities Operational Framework',[15] which is based on the following "3E" initiatives:

1. Economy – to bolster the efficiency and competitiveness of Asian cities.
2. Environment - to identify key environmental issues and prioritize infrastructure investments to develop green cities.
3. Equity – to identify key social issues and prioritize investments accordingly

## KEY INITIATIVES (BY SECTOR)

**Urban Development:** ADB supports the transformation of developing cities into safe, sustainable urban centers, across the energy, transport, information & communication technology (ICT), water supply and sanitation sectors.

**Clean Energy:** ADB supports regional efficiency in energy, transport and urban development sectors through the adoption of renewable energy sources; improving energy access for poor and remote regions (avoiding traditional biomass), meeting energy security needs, facilitating transition to a low-carbon economy, and achieving universal access to energy. ADB's 2016 -2018 project pipeline for the energy sector is $13 billion.

**Transportation and Information & Communications Technology (ICT):** ADB supports low-carbon and climate resilient transport, road safety, and cross-border transport and logistics. For the period 2016-2018, ADB has allocated $16 billion for ICT and transport sectors.

Ongoing activities are in the following areas:

- Telecommunication and ICT infrastructure (e.g. mobile and wireless network, broadband cable networks, data centers, last-mile Internet connectivity)in the Pacific Islands;
- Innovative e-government solutions in Central Asia and South Asia;
- Smart power grids in East and Southeast Asia;
- ICT industries (e.g. ICT centers of excellence, research/computer laboratories; ICT-enabled industries such as business process outsourcing, knowledge process outsourcing, software parks, ICT incubators);

[15] http://www.adb.org/publications/enabling-greeen-cities-operational-framework-integrated-urban-development-southeast-asia

- ICT-enabled services (e.g. ICT applications for governance, education, health, finance); and
- ICT policy, strategy, and capacity development (e.g. ICT policy and strategy, telecommunications policy reform, universal access and service, ICT road maps [national and local], ICT regulations and laws, ICT skills training and capacity building).

**Water:** ADB's Water Operational Plan[16] 2011–2020 targets annual investments of $2-$2.5 billion or $20-$25 billion by 2020. The plan will improve the effectiveness and enhance quality outcomes of water operations.

## FEATURED CITIES AND/OR PROJECTS:

In 2015, under Phase 2 of UOP, ADB approved $1.5 million[17] in regional technical assistance to **'Establish the Future Cities Program.'** This project will prepare integrated urban assessments, engage cities in understanding, identifying, and sharing best practice pathways towards future livable cities.

**Southeast Asia:** ADB assisted the Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT), a sub-regional economic cooperation program, to prepare an 'Implementation Blueprint, 2012-2016'.[18] This Blueprint identified 11 projects, amounting to $5.2 billion, including an **Intercity Motorway Project**[19] in Thailand worth $300 million. In *Myanmar*, ADB provided a $116.8 million loan and technical assistance for the **Mandalay Urban Services Improvement Project** [20],which will improve urban environment and public health in Mandalay City. The Mandalay Regional Government is the executing agency.

**South Asia/ India:** ADB's largest assistance in smart cities is in India, totaling more than $2 billion for both national and state levels. ADB's niche areas for its Smart City program in India are water, waste water, solid waste, drainage, smart water technologies and innovative management approaches.

- $700 million multi-tranche financing facility (MFF) loan to the National Finance Institute (IIFCL/State Bank of India) under the Accelerating Infrastructure Investment Facility in India[21], which will provide funding to financial intermediaries for on-lending on commercial terms to special purpose vehicles (SPVs). This project was approved in 2013.
- $500 million MFF loan for the states of Gujarat, Maharashtra, Tamil Nadu and West Bengal under the **State-Level Support for National Flagship Urban Programs**. ADB is working with the Department of Economic Affairs and Department of Finance. This will support flagship national urban programs in Gujarat, Maharashtra, Tamil Nadu, and West Bengal with high demand for urban services, high urban poverty ratios. The proposed project could be used as a model for the entire country for innovative and efficient infrastructure services delivery in India. Subprojects will be developed under the program to improve urban infrastructure and to introduce good practices in infrastructure design, procurement, and construction. Examples include waste-to-energy and reduce-reuse-recycle (3R) practices for solid and liquid waste (biogas, industrial reuse), remote technology for real-time monitoring of water leakage and water quality (multi-parameter sensors), performance-based turnkey contracts, and trenchless technology for linear pipe laying works, where suitable. ADB Board approval is scheduled for 2017.

The following projects in India are in the pipeline and currently in development. Details have not been finalized.

[16] http://www.adb.org/documents/water-operational-plan-2011-2020

[17] http://www.adb.org/sites/default/files/project-document/178245/49053-001-tar.pdf

[18] http://www.adb.org/sites/default/files/page/34235/imt-gt-implementation-blueprint-2012-2016-july-2012.pdf

[19] http://www.adb.org/projects/45297-002/main

[20] http://www.adb.org/projects/47127-001/main

[21] http://www.adb.org/projects/documents/accelerating-infrastructure-investment-facility-india-rrp

- $1.12 million project preparatory technical assistance for the **State-Level Support for National Flagship Urban Programs**.[22]

  $7 million technical assistance for **Strengthening Climate Change Resilience in Urban**[23] to improve the institutional capacities of the Government of India, and to identify, plan, invest in, and respond to climate change and disaster-related risks in vulnerable cities and towns across India.

- Further, ADB allocates $505 million loan and grant financing with a $215 million counterpart from the Government of India for the Visakhapatnam-Chennai Industrial Corridor Development Program[24] that will support policy reforms and institutional development in the state's industrial sector and priority infrastructure investments in the Visakhapatnam-Chennai Industrial Corridor. The Department of Industries and Government of Andhra Pradesh are the executing agencies.

## CHALLENGES (INCLUDING LOCAL AND NATIONAL MARKET ACCESS BARRIERS FOR SMART CITY GOODS AND SERVICES COMING FROM THE U.S)

In 2015, ADB approved more than $27 billion in loans, guarantees, equity, grants, technical assistance, and co-financing to its developing member countries (DMCs). This translates to business opportunities for contractors, subcontractors, and consultants. To win these opportunities, U.S. firms will have to compete with other firms from 66 other ADB member countries, or may subcontract or partner with these firms. Some firms in DMCs have competitive advantages due to their proximity, lower cost of production, and longstanding local supplier relationships. Thus, U.S. firms must be equipped with marketing strategies appropriate to the ADB market, and know ADB's and borrowing countries' procurement laws and regulations.

Generally, ADB recruits consultants for contracts funded by Technical Assistance; whereas, the DMC's Executing Agencies (Government) are the decision makers for procurement and recruits consultants for contracts funded by loans.

U.S. firms cannot borrow directly from ADB for their business operations; however, private sector-led projects on infrastructure and capital market/ finance sectors may seek financial assistance through ADB's private sector financing.

## IMPORTANT TRADE SHOWS/EVENTS/LINKS:

**ADB Transport Forum 2016**

September 12-16, 2016, ADB Headquarters, Manila, Philippines
Website: http://www.adb.org/news/events/adb-transport-forum-2016
*(Event occurs once every 2 years)*

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ADB's Private Sector Financing:
http://www.adb.org/site/private-sector-financing/

ADB's Clean Energy:
http://www.adb.org/sectors/energy/programs-funds-initiatives

ADB's Sustainable Transport for All:
http://www.adb.org/sectors/transport/main

GrEEEn Solutions for Livable Cities:
http://www.adb.org/publications/greeen-solutions-livable-cities

[22] www.adb.org/printpdf/projects/49107-003/main

[23] http://www.adb.org/projects/49106-001/main

[24] http://www.adb.org/projects/48434-002/main

# Overseas Private Investment Corporation

## ABOUT OPIC

OPIC is the U.S. Government's development finance institution. It mobilizes private capital to help address critical development challenges and in doing so, advances U.S. foreign policy and national security priorities. Because OPIC works with the U.S. private sector, it helps U.S. businesses gain footholds in emerging markets, catalyzing revenues, jobs and growth opportunities both at home and abroad. OPIC achieves its mission by providing investors with financing, political risk insurance, and support for private equity investment funds, when commercial funding cannot be obtained elsewhere. Established as an agency of the U.S. Government in 1971, OPIC operates on a self-sustaining basis at no net cost to American taxpayers.

All OPIC projects adhere to high environmental and social standards and respect human rights, including worker's rights. By mandating high standards, OPIC aims to raise the industry and regional standards in countries where it funds projects. OPIC services are available for new and expanding business enterprises in more than 160 countries worldwide.[25]

## WHAT OPIC OFFERS

OPIC provides financial products, such as loans and guaranties; political risk insurance; and support for investment funds, all of which help American businesses expand into emerging markets. By mobilizing private capital to help solve critical development challenges, OPIC advances U.S. foreign policy, and catalyzes revenues, jobs and growth opportunities both at home and abroad.[26]

## DEBT FINANCING

OPIC financing provides medium- to long-term funding through direct loans and loan guaranties to eligible investment projects in developing countries and emerging markets. By complementing the private sector, OPIC can provide financing in countries where conventional financial institutions often are reluctant or unable to lend. OPIC can meet the long-term capital investment financing needs of any size business in a wide variety of industries.

OPIC's minimum loan/guaranty size is $350,000 and the maximum is $250 million. If a project requires more than OPIC's maximum per-project lending capacity, OPIC is experienced in working with co-lenders to bring sufficient resources to a project. The majority of OPIC's financing is used to cover the capital costs (such as design/engineering services, facility construction or leasehold improvements, equipment) associated with the establishment or expansion of a project in a non-financial industry or to fund the expansion of lending capacity (such as microfinance, SME lending or mortgage lending) by a financial services provider.

OPIC does not consider financing requests that are solely for working capital needs or for the purpose of making an acquisition, though limited working capital or acquisition costs may be financeable if they are a portion of overall project costs. OPIC does not finance export sales that are unrelated to long-term investments in overseas projects.[27]

## POLITICAL RISK INSURANCE

Investing in emerging markets can be unpredictable, even for the most sophisticated investors. While developing markets can offer

[25] https://www.opic.gov/who-we-are/overview

[26] https://www.opic.gov/what-we-offer/overview

[27] https://www.opic.gov/what-we-offer/financial-products

great opportunity, they can also present a variety of political risks beyond an investor's control. Among them:

- War, civil strife, coups and other acts of politically-motivated violence including terrorism
- Expropriation, including abrogation, repudiation and/or impairment of contract and other improper host government interference
- Restrictions on the conversion and transfer of local-currency earnings

OPIC's insurance - combined with our financing options - allows U.S. businesses to take advantage of commercially attractive opportunities in emerging markets, mitigating risk and helping them compete in a global marketplace. OPIC insurance provides innovative, comprehensive, and cost-effective risk-mitigation products to cover losses to tangible assets, investment value, and earnings that result from political perils.

Political risk insurance is available to U.S. investors, lenders, contractors, exporters, and NGOs for investments in 150 developing countries, including high-risk countries such as the Democratic Republic of Congo, Iraq, Afghanistan, and Pakistan. Coverage is offered for small and large investments that provide positive developmental benefits.[28]

## SUPPORT FOR PRIVATE EQUITY FUNDS

In response to the shortfall of private equity capital in developing countries, OPIC provides support for the creation of privately-owned and managed investment funds. OPIC is one of the largest private equity fund sponsors in developing nations and the agency is typically one of the first fund sponsors to enter an unproven market. These funds make direct equity and equity-related investments in new, expanding or privatizing emerging market companies. OPIC-supported funds help emerging economies access long-term growth capital, management skills, and financial expertise, all of which are key factors in expanding economic development and creating new opportunities for people in low-income and developing nations.

OPIC has committed $4.1 billion to 62 private equity funds in emerging markets since 1987. These funds in turn have invested $5.6 billion in more than 570 privately-owned and managed companies across 65 countries. Through our commitments, we catalyze U.S. foreign direct investment and accelerate the economic and social development within these markets.[29]

[28] https://www.opic.gov/what-we-offer/political-risk-insurance

[29] https://www.opic.gov/what-we-offer/investment-fund

# Export-Import Bank

EXIM and Smart Cities: Supporting U.S. Exports

The Export-Import Bank of the United States (EXIM) is the official export credit agency of the United States. EXIM is an independent, self-sustaining Executive Branch agency with a mission of supporting American jobs by facilitating the export of U.S. goods and services.

When private sector lenders are unable or unwilling to provide financing, EXIM fills in the gap for American businesses by equipping them with the financing tools necessary to compete for global sales. In doing so, EXIM levels the playing field for U.S. goods and services going up against foreign competition in overseas markets, so that American companies can create more good-paying American jobs.

Because it is backed by the full faith and credit of the United States, EXIM assumes credit and country risks that the private sector is unable or unwilling to accept. The Bank's charter requires that all transactions it authorizes demonstrate a reasonable assurance of repayment; the Bank consistently maintains a low default rate, and closely monitors credit and other risks in its portfolio.[30]

## SMART CITIES

EXIM's programs aimed at renewable energy and energy efficiency can be used to promote development of smart cities and greater opportunities for U.S. exporters.

EXIM has placed an enhanced focus on providing export finance for energy-efficiency and renewable projects in markets where commercial lenders are hesitant to assume the risk.

EXIM's Environmental Exports Program offers enhancements such as greater risk protection, capitalization of interest during construction and financing for local cost up to 30 % of the U.S. contract price for U.S. goods and services that measurably reduce the consumption, production and utilization of energy while maintaining the same benefits or level of energy service to end users. These include:

## BUILDINGS

Design, engineering or architectural services for new and existing buildings (retrofit), energy audits, energy-efficient insulation, building envelopes, solar-radiant barriers, advanced windows, energy-efficient lighting, water heating (including solar water heaters), refrigeration technologies and smart meters.

## INDUSTRIES

Improvements in industrial design or process to reduce energy utilization, including combined heating, cooling, and power (CHP); waste-heat recovery; preheating and efficient drives (motor, pump, compressors); and other technologies designed to reduce energy intensity.

## POWER-GENERATION FACILITIES

Refurbishment and repowering (including hydropower), improved operation and maintenance practices, and better resource utilization (higher plant load factors and availability).

## REDUCED TRANSMISSION AND DISTRIBUTION LOSSES

High-voltage power lines, better insulated conductors, capacitors, efficient and low-loss

[30] http://www.exim.gov/about

transformers, and improved metering systems and instrumentation.

## SMART-GRID TECHNOLOGIES

Smart meters, remote sensors, energy-management systems and energy-storage devices.

## TRANSPORTATION

Hybrid and electric vehicles; high miles-per-gallon (MPG) vehicles; compressed natural-gas (CNG) vehicles; and public-transportation projects, including urban mass-transport systems, modal shifts to city and intercity rail and water transport, and improved fleet usage.[31]

## RENEWABLE EXPRESS

EXIM's "Renewable Express" is designed to provide streamlined post-completion project financing to small renewable-power producers that meet EXIM's credit standards. This initiative meets the increased demand for financing of small renewable-power transactions.

Under Renewable Express, EXIM will be able to consider project financing for small renewable-power producers seeking loans of $3 million to $10 million. Renewable Express is available for both corporate balance sheet and limited-recourse transactions that fit within the program's parameters and where the repayment is generated from the project's cash flows.

Traditionally, project financing has not been available for small transactions due to the high levels of due diligence and advisory fees incurred in a typical project financing. By comparison, with Renewable Express, EXIM will use a streamlined procedure to more quickly and efficiently evaluate and underwrite the borrower's credit. If all of the requirements of the program are fully met, EXIM can process a Renewable Express application in as little as 60 days.

## KEY QUALIFICATIONS

- Both direct loans and guarantees are available. For expedited treatment, the EXIM tranche will be the only debt financing.
- Local cost financing of up to 30 % of the net U.S. export contract is available.
- Single take-out disbursement after completion of the project. Could consider pre-completion funding for widely used technologies with an experienced operator.
- Financing of up to 18 years is available, depending upon the project's economics.
- The transaction must comply with EXIM policies and procedures as required.[32]

**For more information about these and other EXIM programs visit www.exim.gov

[31] http://www.exim.gov/policies/ex-im-bank-and-the-environment/energy-efficiency-and-end-use-energy-efficiency-exports

[32] http://www.exim.gov/what-we-do/loan-guarantee/renewable-express

# World Bank

## FINANCING INSTRUMENTS

- **Investment Project Financing** provides IBRD loans, IDA credits/grants and guarantees financing to governments for activities that create the physical/social infrastructure necessary to reduce poverty and create sustainable development.
- **Development Policy Financing** provides IBRD loans, IDA credits/grants and guarantees budget support to governments or a political subdivision for a program of policy and institutional actions to help achieve sustainable, shared growth and poverty reduction.
- **Program-for-Results** links disbursement of funds directly to the delivery of defined results, helping countries improve the design and implementation of their own development programs and achieve lasting results by strengthening institutions and building capacity.
- **Trust funds and grants** allow scaling up of activities, notably in fragile and crisis-affected situations; enable the Bank Group to provide support when our ability to lend is limited; provide immediate assistance in response to natural disasters and other emergencies; and pilot innovations that are later mainstreamed into our operations.
- **Private sector options** for financing, direct investment and guarantees are provided by MIGA and IFC.
- **Customized options and risk management**

## INVESTMENT PROJECT FINANCING (IPF)

IPF is used in all sectors, with a concentration in the infrastructure, human development, agriculture, and public administration sectors. IPF is focused on the long-term (5 to 10 year horizon) and supports a wide range of activities including capital-intensive investments, agricultural development, service delivery, credit and grant delivery [including micro-credit], community-based development, and institution building.

Unlike commercial lending, Bank IPF not only supplies borrowing countries with needed financing but also serves as a vehicle for sustained, global knowledge transfer and technical assistance. This includes support to analytical and design work in the conceptual stages of project preparation, technical support and expertise (including in the areas of project management and fiduciary and safeguards activities) during implementation, and institution building throughout the project.

## DEVELOPMENT POLICY FINANCING (DPF)

DPF provides rapidly-disbursing financing to help a borrower address actual or anticipated development financing requirements. DPF aims to support the borrower in achieving sustainable development through a program of policy and institutional actions, for example, strengthening public financial management, improving the investment climate, addressing bottlenecks to improve service delivery, and diversifying the economy. DPF supports such reforms through non-earmarked general budget financing that is subject to the borrower's own implementation processes and systems. The Bank's use of DPF in a country is determined in the context of the Country Partnership Framework (CPF).

The DPF policy emphasizes country ownership and alignment, stakeholder consultation, donor coordination, and results, and requires a systematic treatment of fiduciary risks and of the potential environmental and distributional consequences of supported policies. DPF can be

extended as loans, credits, or grants. Funds are made available to the client based on:

- maintenance of an adequate macroeconomic policy framework, as determined by the Bank with inputs from IMF assessments
- satisfactory implementation of the overall reform program
- completion of a set of critical policy and institutional actions agreed between the Bank and the client.[33]

## SERVICES

### Technical Assistance

The World Bank Group can provide professional technical advice that supports legal, policy, management, governance and other reforms needed for a country's development goals. Our wide-ranging knowledge and skills are used to help countries build accountable, efficient public sector institutions to sustain development in ways that will benefit their citizens over the long term. Bank staff offer advice and support governments in the preparation of documents, such as draft legislation, institutional development plans, country-level strategies, and implementation action plans. We can also assist governments to shape or put new policies and programs in place.

### Reimbursable Advisory Services (RAS)

Through RAS, the Bank can provide clients access to customized technical assistance on a reimbursable basis, either as a stand-alone or to complement an existing program. This allows us to provide advisory services that the client demands, but that the Bank cannot fund in full within the existing budget envelope. RAS programs have been used in more than 40 countries since the 1970s. World Bank member countries of all income levels can access RAS. Clients can be countries and government entities, but also states and municipalities, state-owned enterprises, civil society organizations, and multilateral agencies.

### Economic and Sector Work

In collaboration with country clients and development partners, Bank country staff gather and evaluate information (data, policies and statistics) about the existing economy, government institutions or social services systems. This data provides a starting point for policy and strategic discussions with borrowers and helps enhance a country's capacity and knowledge. Studies and analytical reports help us support clients to plan and implement effective development programs and projects.

### Donor Aid Coordination

The World Bank Group acts on occasion as a coordinator for organized regular interaction among donors (governments, aid agencies, humanitarian groups, foundations, development banks). Activities range from simple information sharing and brainstorming, to co-financing a particular project, to joint strategic programming in a country or region. It also includes the preparation of donor coordination events such as consultative group meetings (joint meetings of partners) focused on a particular issue or country.[34]

**For more information about these and other World Bank Urban Development programs, visit http://www.worldbank.org/en/topic/urbandevelopment

[33] http://www.worldbank.org/en/projects-operations/products-and-services

[34] http://www.worldbank.org/en/projects-operations/products-and-services#3

# African Development Bank

## FINANCING THE STRATEGY—MOBILIZING AND LEVERAGING NEW SOURCES OF DEVELOPMENT FINANCE

The Bank's financial resources will always be a small fraction of Africa's requirements. Current fiscal constraints in donor countries suggest that official development assistance could well be largely stagnant in the coming years.

The Bank will therefore seek new and creative ways of mobilizing resources to support Africa's transformation, especially by leveraging its own resources.

The Group will of course continue to build on and expand the size and the practical operations of both the African Development Bank and the Africa Development Fund. But with the changing global economic landscape, it will explore options for attracting additional investment from emerging economies and from new funders and donors, including sovereign wealth and pension funds. It will use its existing instruments better, while developing new ways of ensuring that a dollar invested by the Bank unlocks significantly more from other investors. Wider use of public-private partnerships, co-financing arrangements and risk-mitigation instruments will draw in new investors.[35]

## AFRICAN FINANCING PARTNERSHIP

### Background and Objectives

The African Financing Partnership (AFP) is a collaborative, co-financing platform amongst Development Finance Institutions (DFIs) active in private sector project financing in Africa. The AFP is a component of the AfDB's mission to help reduce poverty in Africa by mobilizing resources for private sector development on the continent.

The objective of the AFP is to bring together DFI partners with a similar mission so that further results could be delivered through combined efforts.

The AFP is based on the partnership strategy set out in the Strategy Update for the Bank's Private Sector Operations, approved by the AfDB Board of Directors in January 2008. There is evident need for partnerships, including with external development finance institutions, to enhance the effectiveness and efficiency of financing in Africa.

An AFP MOU is being signed between the core group of eight DFIs called the AFP Promoting Partners. The MOU endorses improvement in efficiency across multilateral and bilateral financing institutions, achieving best practices, reducing cost and "doing more with less." The partners include:

- AfDB
- Deutsche Investitions UND Entwicklungsgesellschaft MBH (DEG)
- Development Bank of Southern Africa Ltd. (DBSA)
- European Investment Bank (EIB)
- Industrial Development Corporation of South Africa Ltd. (IDC)
- International Finance Corporation (IFC)
- Nederlandse Financierings Maatschappij Voor Ontwikkelingslanden N.V. (FMO)
- Société de Promotion et de Participation pour la Coopération Economique S. A. (PROPARCO)

Following the signing of the MOU, the AFP would expand to include other DFIs and commercial financial institutions partners as AFP Participating Partners. The AFP legal models would range from pure cofinancing structures, through the quasi syndication phase of involving smaller DFIs and commercial partners along with syndication

[35] http://www.afdb.org/en/about-us/mission-strategy/financing-the-strategy/

under a Bloan approach and to the potential establishment of AFP as a special purpose vehicle.

**Areas of Focus / Sub-Sectors**

The two main areas of focus are:

- Harmonization: creating common best practices and collaboration between DFIs operating in Africa;
- Additionality: using DFI capital to leverage private capital for catalyzing greater investments in development in Africa.

**The three main sectors of operations under the AFP are:**

- Infrastructure – Power, Transport, ICT and Water/Sanitation;
- Industries – Extractive Industries, Agribusiness and Healthcare; and
- Financial Institutions – African DFIs, Banks, Microfinance, Guarantees

**Target Beneficiaries**

The AFP aims at the efficient mobilization of resources for investment in project financing in Africa. The beneficiaries would include infrastructure and industrial related projects with large funding requirements. This would lead to the creation of jobs and socio-economic development on the continent.

**Administration and Governance Structure**

The AFP Secretariat is established at AfDB, in the Private Sector Department (OPSM). The AFP has a steering committee composed of the heads of strategic business or private sector departments for Africa at the respective AFP Promoting Partners. This AFP Committee meets at least twice a year, including at the Annual Meetings of the AfDB. AFP focal points at each DFI will participate in monthly conference calls on the AFP projects pipeline and other coordination matters.[36]

[36] http://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/african-financing-partnership/

# Inter-American Development Bank

"Smart Cities" is about using Information and Communication Technology (ICT) (sensors, geographical information systems, computerized management systems, communication interfaces, etc.) to address urban issues, such as mobility, waste disposal, citizen security and citizen participation. The benefits of using ICT to help cities advance towards urban sustainability have been well-documented. And results overall indicate that smart, innovative and technology-based solutions are cost-effective in the provision of urban services. However, migrating from traditional to smart city management requires building institutional capacity at the municipal level, plus robust city planning and additional investments. How can cities in Latin America and the Caribbean (LAC) finance smart city programs?

## A TOOLKIT FOR FINANCING SMART CITIES IN LATIN AMERICA AND THE CARIBBEAN

Estimates by the Emerging and Sustainable Cities Program at the Inter-American Development Bank[37] suggest that a smart city project can cost anything between US$20 million to US$30 million for intermediate cities.[38] This includes 600 km of fiber optics to connect public buildings and infrastructure, 400 video surveillance cameras, 70 sensors, computer hardware, the development of customized city applications, as well as an integrated operation and control center and training of public officials. To meet this level of investment, cities can appeal to the traditional urban infrastructure financing toolkit, which includes public funding and private-sector financing.

### Public Funding

Municipal governments have access to a wide range of public funding sources to support smart city projects, including central government grants and own-source revenue (i.e. local taxes, user tariffs, etc.). The latter is in some respect analogous to business operations – the city provides services to residents and in exchange urban dwellers pay for the services they receive. Conversely, grants – which represent nearly two-thirds of local government revenue in LAC – are centrally transferred funds which aim to help local governments fulfill their mandates.

Albeit the largest metropolitan areas, most cities in LAC today can only support smart city projects through public funding, either through revenue from general taxes (i.e. property taxes) or by allocating centrally transferred funds. This is typically the case in cities where low municipal creditworthiness negatively affects opportunities for public-private partnerships (PPPs) and municipal debt issuance. Interestingly enough, cities can use smart city applications to improve their creditworthiness in the medium-term by modernizing public financial management and cadaster systems that can enhance revenue collection; demonstrating better performance in municipal governments' balance sheets and income statements is a strategic step in this direction.

### Private Sector Financing

Municipalities with better credit standings are able to engage with the private sector to invest in smart city projects through different models, including PPPs. The city of Medellin in Colombia, for example, created a smart urban mobility system

[37] The Emerging and Sustainable Cities Program (ESC) is the IDB's non-reimbursable technical assistance program providing direct support to national and subnational governments in the development and execution of city Action Plans. ESCI employs an integrated and interdisciplinary approach to identify, organize and prioritize urban interventions to tackle the main roadblocks that prevent the sustainable growth of emerging cities in LAC. This transversal approach is based on three pillars: (i) environmental and climate change sustainability, (ii) urban sustainability, and (iii) fiscal sustainability and governance. Since its launch in 2011, the ESCI has been working with 71 cities across the LAC region.

[38] http://www.iadb.org/en/topics/emerging-and-sustainable-cities/smart-city-management,20282.html

(SIMM) to monitor real-time traffic information, allowing local authorities to improve mobility in the city.

Through the PPP agreement, private-sector firms were required to design and manage a smart mobility control center which included 80 electronic traffic detection cameras, 120 interconnected traffic lights with vehicle detection sensors, closed-circuit television, variable messaging panels, and a user information system[39]. In return, firms partially collected revenue from traffic violation tickets the overall system detected. Anecdotally, evidence suggests that the project reduced transport-related accident rates, pollution and fuel consumption. Furthermore, it increased municipal revenue: traffic tickets-related income rose from $9.3 million in 2011 to US$14.19 million in 2014.

## THE INTER-AMERICAN DEVELOPMENT BANK (IDB) GROUP AND SMART CITIES

The IDB Group client base includes central governments, sub-national governments, private firms, and NGOs. Besides the traditional loans for investment projects or the policy based loans, the IDB Group offers several financial products to support smart city initiatives, including technical cooperation's, fee for service, credit guarantees, syndicated loans and equity or quasi-equity. These instruments can be further categorized into sovereign guaranteed, non-sovereign guaranteed or both.

### SOVEREIGN AND NON-SOVEREIGN GUARANTEED INSTRUMENTS

#### Grants and Fee for Service

The IDB offers technical assistance for cities exploring ways to implement smart city projects through grants and fee-based services through its recently created Housing and Urban Development Division. Both instruments can be delivered with and without sovereign and non-sovereign guarantees.

#### Blended Finance

Furthermore, the IDB Group also offers structured Blended Finance Solutions to support smart city projects. The IDB Group can mobilize national grant funding or other external resources along with its own capital to foster smart cities across the region.

#### Partial Credit Guarantees

Other financial instruments also include Partial Credit Guarantees (PCGs)[40], which constitute valuable financial instruments as they can be structured in such a way that they to contribute to closing the gap in local-currency financing for urban infrastructure projects. The use of PCGs allows for risk disaggregation and allocation rather than just acting as a risk mitigant; thus supporting more efficient financing structures. Moreover, PCGs are quite flexible and can have multiple purposes including the issuance of debt through domestic financial intermediaries in local currencies or risk sharing facilities with financial intermediaries. The IDB Group offers Sovereign Counter-Guaranteed (SCG) Guarantees and Non-Sovereign Guaranteed (NSG) PCGs. In this way, the Bank can intervene along the cycle of investment in smart cities and overall urban infrastructure needs.

#### Partial Credit Guarantees - Sovereign Guaranteed

Partial Credit Guarantees with Sovereign Guarantees (SG), on one hand, are available for (i) all borrowing country members; (ii) have to be consistent with the respective Country Strategy and all cross-sector policies applicable to SG loans are applicable to SCG guarantees; (iii) have private sector financiers as beneficiaries; (iv) can be issued to support sub-nationals or local government projects as long as the sovereign (i.e., federal or central government) agrees to reimburse the Bank (through a counter-guarantee

[39] Inter-American Development Bank (2016). Smart Cities Guide. Washington, DC.

[40] Credit guarantees are designed to credit-enhance all or a portion of the funding provided by private financiers, such as the repayment of loans, bonds or other debt financing instruments (scheduled or bullet), and can be used to cover any category of risk, including financing risk, construction risk, operation risk, fuel supply risk, hydrologic risk and other project risks, which could ultimately trigger a debt payment default to creditors.

agreement or any other similar instrument) for any disbursement made under the guarantee; (v) can be approved, denominated disbursed and repaid in US$, in all major currencies or in local currency (from borrowing member countries), subject to the Bank's ability to adequately source and/or hedge itself against currency exposures, and operational and risk management considerations; and (vi) can cover up to 100% of project costs if merited by their developmental impact.

### Partial Credit Guarantees – Non-Sovereign Guaranteed

Partial Credit Guarantees without Sovereign Guarantees (NSG), on the other hand, are flexible instruments that can be used as a proxy to source local currency (Local Currency Loan Guarantee); to credit enhance corporate bond issuances (Corporate Bond PCG); to support asset securitizations (Securitization PCG); to support risk-sharing facilities with other financial intermediaries (Risk Sharing Facility PCG).

## OTHER NON-SOVEREIGN GUARANTEED FINANCIAL INSTRUMENTS

### Syndicated Loans

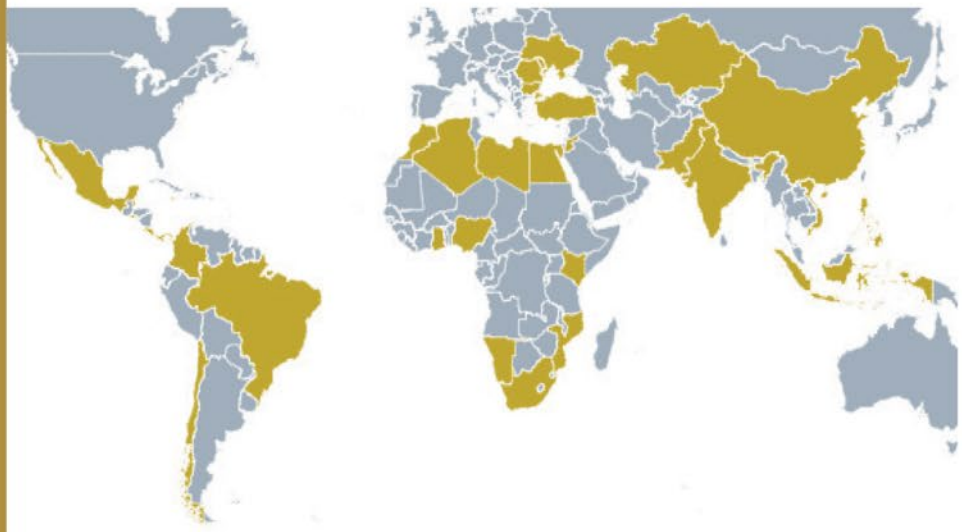
Another particularly important non-sovereign product regarding private entities' participation, including PPPs or concessions, is the A/B Loan program. In this type of syndicated loan, the IDB attracts banks and other institutional investors, mobilizing resources to the region. The A-Loan constitutes the IDB Tranche while the B-Loan is participated out to the investors. The IDB is the Lender of Record for the A/B Loan. Such structure offers benefits for both the borrowers and the financial institutions partnering with the Bank because participants benefit from IDB's relationship with host country governments ("halo effect").

### Equity or Quasi-Equity

Furthermore, IDB's Investment Corporation (IIC) also has a moderate capacity to invest directly in companies and through private equity funds, offering different equity and quasi-equity instruments to meet specific business and project needs in the form of common shares, preferred shares, warrants, etc.

More details on how the IDB supports smart cities are available at http://www.iadb.org.

# SMART SOLUTIONS FOR SMART CITIES



As emerging markets are experiencing unprecedented population growth and rapid urbanization, they are focused increasingly on deploying smart solutions for their cities. The U.S. Trade and Development Agency is at the forefront of these efforts. USTDA helps develop smart urban infrastructure by deploying innovative U.S. technologies in emerging markets around the world.

The Agency's partners have long invested in intelligent solutions for transportation, energy and e-citizen services. But they are now increasingly beginning to realize that the key to a truly smart city is integration. USTDA and its U.S. industry partners are well positioned to help emerging markets build safe, efficient and integrated infrastructure.

**Since 2009, USTDA has supported almost 200 projects worldwide, leading to over $832 million in U.S. exports for smart solutions for smart cities.**

## 198 "SMART SOLUTIONS" PROJECTS

- ENERGY (78)
- TRANSPORTATION (34)
- TELECOM (34)
- WATER (32)
- E-CITIZEN SERVICES (10)
- HEALTH (10)

# U.S. TRADE AND DEVELOPMENT AGENCY

# SECTOR SPOTLIGHT AND SUCCESS STORIES

## DEPLOYING BIG DATA SOLUTIONS IN ISTANBUL

With the help of USTDA and other partners, the Municipality of Istanbul has already built a strong foundation of enhanced smart services. But as its population is expected to surpass the largest European cities by 2020, it is important to prepare for continued growth—and to meet the expectations of increasingly engaged citizens. USTDA is currently supporting the Municipality's efforts to **invest in big data solutions** that will further integrate their IT infrastructure. This will help Istanbul continue to **improve city operations, enhance disaster management and provide efficient, reliable public services.**

## CONNECTING U.S. FIRMS TO INDIA'S SMART CITIES

USTDA is catalyzing U.S. industry expertise and resources to support Prime Minister Modi's **goal of building 100 smart cities across India.** The Agency is leveraging its crosscutting experience to deliver technical assistance and to pilot technologies that will help India develop cities that are cleaner, more efficient and have a lower carbon impact. **USTDA is helping three Indian state governments** identify U.S. solutions that can help them build smart, sustainable infrastructure in the cities of Allahabad, Ajmer and Visakhapatnam.

## ABOUT THE U.S. TRADE AND DEVELOPMENT AGENCY

As the U.S. government's project preparation agency, USTDA helps to:

- **Pilot new and innovative technologies** in cities around the world
- Properly **prepare projects to attract financing** from public and/or private sources
- **Introduce overseas stakeholders to U.S. expertise** and best practices to develop optimal infrastructure design

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# TRADE PROMOTION

**The Trade Promotion** section of this Guide offers ITA's Global Market teams' perspective of individual countries smart city activities. ITA provides resources to educate companies about how to tailor their activities to specific markets with respect to their product offerings, financing, marketing, assembly and logistics. ITA also houses the US Commercial Service, the arm of the U.S. government that promotes trade and U.S. business globally. The US Commercial Service is a direct advocate in countries all over the world for U.S. exporters interested in opportunities in Smart Cities and with foreign governments looking for U.S. companies to partner with on Smart City projects. Additionally in this section you will find Smart City regional activities in which Commerce, and particularly ITA, is engaged in throughout the world.

Below is a brief overview of how ITA can help your U.S. company with international exports; individual country initiatives related to smart cities follows. The information listed in each country overview is from the individual U.S. Commercial Service office. Selected city trend data, noted in captions, is courtesy of the Brookings Metro project. General data on population and GDP per capita is from https://www.cia.gov/library/publications/the-world-factbook/.

Should you have questions regarding individual country information, please email smartcities@trade.gov.

Details of the export offerings below available at http://www.export.gov/salesandmarketing/index.asp.

## HELPING U.S. COMPANIES EXPORT

Leverage the knowledge and influence of the U.S. government and ITA's vast global network of international business experts, contacts and partners. With offices in more than 100 U.S. cities and 70+ countries across the globe, ITA offers U.S. companies exporting information, advice and cost-effective end-to-end international business solutions. Visit our http://export.gov to find out more including locating a trade specialist near your city.

## INFORMATION AND COUNSELING

Successful exporters know who they can trust to get the information and guidance they need to make sound business decisions. Depending on whether you are considering exporting or already exporting, the U.S. Commercial Service provides U.S. companies with reliable information and personalized counseling at every step of the exporting process – from strategy and planning to financing and logistics to market entry and expansion and advocacy.

## THE GOLD KEY MATCHING SERVICE - INTERNATIONAL SALES/MARKETING

If you would like to reduce the time and money you invest in locating and screening prospective trade partners, consider letting the U.S. Commercial Service arrange business meeting with **pre-screened contacts.** Through a variety of services offered, the Gold Key Service will enable you to more efficiently manage your company.

## STRATEGY AND PLANNING

An international business plan that includes a strategy for entering or expanding into targeted markets is critical to your success in the global

marketplace. The U.S. Government provides U.S. companies with cost-effective resources to help you develop a new international business plan, or improve your already existing international business plan.

## MARKET RESEARCH AND INTELLIGENCE

Accurate, up-to-date market intelligence is essential for your company to target the best international market opportunities and make informed business decisions when evaluating potential overseas business partners. You can leverage the knowledge and resources of the U.S. government by tapping into ITA's vast network of experts, contacts and partners in 70+ countries across the globe to get world-class market intelligence. Most U.S. Commercial Service services are free of charge to all U.S. businesses. However, certain products and services including customized market research and company background reports do have a fee. Fee-based services can be found on our user fee schedule.

## ADVERTISING AND PROMOTIONAL EVENTS

Once you've developed an international business plan and targeted the best international market opportunities, the next step is to ensure that potential customers and business partners recognize the existence, availability and benefits of your company's products/services. You can leverage the credibility and influence of the U.S. Government and our vast global network of international business experts, contacts and partners to increase your brand awareness and market exposure in countries around the world.

## MARKET ENTRY AND EXPANSION

Leverage the expertise, resources and connections of the U.S. Government to find and establish business relationships with potential agents, distributors or other strategic partners overseas. The U.S. government can help you learn about the methods, channels and other considerations of market entry and expansion. It can find potential agents, distributors, or other strategic partners overseas, and arrange for your company to have meetings with them. All of this will help your company ensure a long-term, sustained entry or expansion in your market.

## ADVOCACY

U.S. Government advocacy assistance can help U.S. companies overcome trade barriers, bureaucratic problems and unfair trading practices; level the playing field to ensure that your company has the best possible chance to win foreign government contracts; and provide information on the local legal system and resources in the event of a dispute.

## SMART CITIES COUNTRY GUIDE

# Table of Contents

# Argentina Smart Cities Guide

## BASIC DATA ON THE ECONOMY

GDP per capita (PPP; 2015): $22,600[41]

Major urban areas: Buenos Aires – 15.18 million; Córdoba – 1.51 million; Rosario – 1.38 million

Population (July 2015): 43,431,886

Industries: textiles, food processing, motor vehicles, consumer durables, textiles, chemicals

## SMART CITY OVERVIEW

Argentina is the 3rd largest Spanish-speaking country in the world and has strong international business potential despite its rough economic past. Nearly 92% of its total population lives in an urban area; higher than Chile, Brazil, Colombia, and Peru.[42] It also ranks 23rd in the world and 5th in the Western Hemisphere for Internet users, which represent around 60% of its total population (2014 est.).[43] Buenos Aires, the economic and political capital of Argentina, is a strong example of smart city practices. In 2014, the IESE Business School Cities in Motion Index ranked Buenos Aires as the second best city in the Latin America region.[44] The majority of Smart City initiatives have occurred in its greater metropolitan area.

## KEY INITIATIVES (BY SECTOR)

### SMART LIGHTING

The city of Buenos Aires recently converted 91,000 public street lights to modern LED technology that helps reduce energy consumption.[45] The lights also have real-time monitors that improve maintenance costs and efficiency.[46] The monitors allow the city to respond to power outages, broken lights, or vandalism in a fraction of the time before the installation.[47]

### SMART DISASTER PREVENTION

The city of Buenos Aires is situated near the coast next to the mouth of the Río de la Plata, which makes it prone to flooding. After a 2013 flood that caused 50 casualties, the city digitized its drainage system and automated 1,500 km of its drainage pipes. This system will prevent many of the back-ups and drainage issues that contributed to past flooding problems. The city plans to digitize other sectors such as security and transportation.[48]

### SMART PUBLIC ADMINISTRATION

The city of Buenos Aires averages about 30,000 public complaints regarding public services per month. In 2008, the Environment and Public Spaces Ministry for the city government began implementing technological solutions

[41] All basic data is from the CIA World Factbook: https://www.cia.gov/library/publications/the-world-factbook/geos/ar.html

[42] https://www.cia.gov/library/publications/the-world-factbook/geos/ar.html

[43] https://www.cia.gov/library/publications/the-world-factbook/rankorder/2153rank.html#ar

[44] This is according to several indicators including governance , human capital, social cohesion, public sector management and others. See: http://www.iese.edu/research/pdfs/ST-0366-E.pdf

[45] http://www.philips.com/a-w/about/news/archive/standard/news/press/2013/20131016-Philips-renews-the-street-lighting-system-of-Buenos-Aires-with-LED-technology.html

[46] https://blogs.saphana.com/2016/03/23/buenos-aires-digitizes-smart-city-sap-hana/

[47] http://www.forbes.com/sites/sap/2016/03/29/3-ways-buenos-aires-is-leading-smart-city-technology/#7fe50b5e1a0e

[48] http://www.forbes.com/sites/sap/2016/03/29/3-ways-buenos-aires-is-leading-smart-city-technology/#7fe50b5e1a0e

to responding to these complaints, such as connecting with residents on social media. Residents can now tweet or post a picture of any problem with city infrastructure or safety. The city now promises a maximum response time of 72 to 96 hours for any complaint.[49]

## FEATURED CITIES AND/OR PROJECTS

**Buenos Aires:**

- Buenos Aires was a 2015 Smart City Expo World Smart City Finalist.[50]
- In 2011, then Head of Government Mauricio Macri created the Ministry of Modernization to improve the operation of Buenos Aires through technological improvements to public administration. This Ministry includes an Undersecretary of Smart City who handles special social innovation projects.[51]
- The city has also passed personal data protection and public information access laws to support a growing information-based society.[52]
- The city features public Wi-Fi.[53]

**Córdoba:**

- Although much further behind Buenos Aires in Smart City development, Córdoba initiated its "Córdoba 10" plan to initiate social cohesion, public spaces, and energy improvements.[54]
- "Córdoba LUZe" is a program that set goals for a 20% reduction across energy consumption, emission output, and installation of renewable energy resources.[55]

## UPCOMING EVENTS CALENDAR

- June 1-4, 2016: The 14th Congress of the International Association of Educating Cities will occur – Rosario
- June 28-29, 2016: Argentina will celebrate its first event
- November 1-2, 2016: Argentina celebrates the first Congreso de Ciudades Inteligentes, Innovadoras, y Humanas – Buenos Aires

[49] http://www.forbes.com/sites/sap/2016/03/29/3-ways-buenos-aires-is-leading-smart-city-technology/#7fe50b5e1a0e

[50] http://www.smartcityexpo.com/awards-2015

[51] http://www.smartcbi.org/index.php/en/city-halls/64-america/639-argentina-smart-cities

[52] http://www.smartcbi.org/index.php/en/city-halls/64-america/639-argentina-smart-cities

[53] http://turismo.perfil.com/36323-smart-city-buenos-aires-entre-las-ciudades-mas-inteligentes-del-mundo/

[54] https://www.esmartcity.es/articulos/cordoba-10-comunicacion-habitabilidad-y-eficiencia-energetica

[55] https://www.esmartcity.es/articulos/cordoba-10-comunicacion-habitabilidad-y-eficiencia-energetica

# Austria Smart Cities Guide

## SMART CITY OVERVIEW

Austria boasts a highly developed economy and, with a wide range of smart city initiatives, is very much at the forefront of the smart city movement in Europe. The need to accommodate increasing urbanization together with the desire to pursue energy conservation and environmental objectives are the main political drivers. Currently 66% of the population lives in cities or urban regions, 84% use the Internet frequently, 63% use smartphones on a regular basis, and 81% of households have access to broadband.

**VIENNA-BRATISLAVA, Austria**

Population Growth, 2013-2014:
**0.57%**

Total Employment, 2014 (Thousands):
**1,975 People**

Real GDP Growth 2013-2014:
**1.0%**

Employment Growth, 2010-2014:
**1.1%**

*Brookings Metro*

The Climate and Energy Fund and the Federal Ministry of Transport, Innovation and Technology have been funding Austrian Smart City Projects since 2010. At present, activities in ten model regions for e-mobility, 104 climate and energy model regions, 29 smart cities, five smart urban regions and one smart grids model region are being financed or co-financed. Austria is also an integral part of European initiatives in this field and is actively supporting the EU Strategy for the Danube Region, contributing to international know-how transfer. Austrian cities are keen on developing new cooperation projects and partners.

## KEY INITIATIVES (BY SECTOR)

### SMART ENERGY

Electricity transmission: The country's transmission service, Austrian Power Grid AG, plans to add 200km to the 380kV and 550km to the 200kV lines. Estimated cost: $7.7billion. Smart Meters: In 2012, Austrian passed legislation mandating that 95% of all households and commercial electricity customers have a smart meter by 2019. The implementation phase is currently ramping up, with 10% coverage expected by the end of 2015 and 70% by the end of 2017. The 2012 legislation is in response to the EU Directive 2009/72/EC, which mandates the introduction of smart meters into 80% of European households by 2020 where a positive cost-benefit analysis can be shown.

Smart Grids: drivers are the need to integrate volatile decentralized power generation into the electricity mix and the necessity to support mandated smart metering functionalities. Austria is part of the SHC Task 42 "Advanced Materials for Compact Thermal Energy Storage". One strong research focus is system solutions for sustainable energy supplies in urban areas. The Austrian Institute of Technology, the Institute of Energy at the Johannes Kepler University Linz, the Umweltbundesamt and e7 Energie Markt Analyse are working on a district heating/cooling roadmap for Austria. District heating and cooling systems are in place in many cities including Vienna.

### SMART BUILDINGS

The "Haus der Zukunft" (house of the future) initiative promotes the development of energy conserving building designs and showcases technologies reducing the carbon footprint of residential buildings. This successful initiative has grown to include a "City of Tomorrow" program that expands those objectives into a city space. Zero-energy or even positive energy houses are the gold standard for smart buildings in Austria. The MarxBox" is a mixed-use building in Vienna that received the "Leadership in Energy and Environmental Design" in gold from the U.S. Green Building Council. In 2013, Austria's "LISI house" won the U.S. Department of Energy's Solar Decathlon. It is characterized by a synergy of

the modular timber construction and the use of renewable materials and energies. The Austrian government provides limited funding for the installation of PV plants, especially in agricultural and horticultural enterprises (available funding for 2016 € 8.5 million - approx. $ 9.4 million). In Vienna, the world's first zero-energy hotel opened in 2009.

## SMART TRANSPORTATION AND MOBILITY

Transport accounted for 36.25% of Austria's greenhouse gas emission in 2012, according to the United Nations Climate Change Secretariat. In order to achieve a 80% reduction by 2050, Austria is keen on reducing transport emissions. Current electric vehicle incentive programs are insufficient to encourage significant increases in market share, and these vehicles remain a niche product. However, the Smart Mobility initiative, promotes public transport in order to free up public space utilized by private vehicles. Austrian Mobile Power is an alliance of European manufacturers and stakeholders advancing electric mobility in Austria: www.austrian-mobile-power.at

Public transportation apps such as "AnachB" in the Vienna region and "Scotty" for the federal railways provide multimodal transportation options, including bus and tram arrival and departure times. The "Smart Urban Logistics" initiative deals with integrative intelligent transportation systems (ITS) in urban areas. At present there are calls out for pilot projects for sustainable logistics concepts and systems, as well as intelligent multimodal combinations. As outlined in the EU White Paper 2011 "Roadmap to a Single European Transport Area ", the program is designed to reduce emission stemming from urban freight transport by 60% until 2050. Vienna's e-mobility on demand project includes e-carsharing, e-carpooling, and e-taxi services. Today, 80% of the planned charging stations are in use, and a substantial increase in the number of available vehicles is planned. Further initiatives include e-limousine services, e-car rentals and e-courier services. Additional project partners are welcome.

## SMART HEALTHCARE

The most important development in the health IT space is ELGA (electronic health record), which began pilot operation in Vienna and Graz at the beginning of 2016. This first phase established an information network between participating hospitals that allows them to exchange limited patient information. Though there are concerns about data privacy and security, ELGA aims to eventually provide doctors, pharmacists, hospitals and care facilities nationwide with access to important patient information, including laboratory results, medical history and current medication regimes. ELGA includes an e-medicine function designed to reduce the prescription of conflicting or overlapping medication.

The Austrian e-card is a chip card currently used as an electronic health insurance voucher. It is also capable of supporting electronic signatures and could be used as a citizen card in the future. The "SeniorTab" program employs easy-to-use tablet PC software, giving senior citizens access to the basic functions of a smart phone such as telephone and email communications, Internet access, and more. The program is currently in a pilot phase. More information is available at www.seniortab.at. Another example of health-IT is the patient portal in the biggest hospital in Vienna, the Vienna General Hospital. Here patients can find their medication, appointments schedules, etc., in one stop.

## CHALLENGES

There are three main challenges to engage on smart city programs in Austria.

1. The first and most prevalent is the worry about data security/privacy. People are concerned that their data could be used against them – that employers could find out about employee health conditions, or that burglars could figure out when people are not home. While this attitude is an obstacle for smart city projects in general, it should also be seen as a boon for cybersecurity products and services.

2. Another challenge is the local advantage. Since smart cities are by definition infrastructure projects, local players and companies with a strong local presence have a clear advantage. This hurdle can be overcome by carefully choosing a local partner who is plugged into the flow of information and is familiar with procurement and project development.
3. Finally, there are the ubiquitous questions of interoperability – often local communications protocols, radio frequencies, electrical standards, etc., are different from region to region. Only through ongoing communication within the smart cities community can mutually recognized standards and protocols be developed.

## FEATURED CITIES AND/OR PROJECTS

**Vienna:**

Smart City Objective: Vienna intends to reduce CO2 per capita by 80% with an energy savings of 40%. After receiving the World Smart Cities Award in 2010, Vienna is implementing seven Smart City projects. In addition, Vienna has developed a comprehensive Smart Cities strategy.

Public transit: The Viennese currently use public transit for 39% of their movements within the city, and over 680,000 have a year pass. This is one of the highest rates in the EU.

"Aspern—Vienna's Urban Lakeside", one of the biggest greenfield urban development projects in Europe, is implementing a number of innovative smart city elements.

Energy: Vienna is pursuing a strategy to expand the use of renewable energy. Currently district heating covers 40% of city households, and renewable energy and waste heat each account for 11% of the total energy mix.

Find out more about Vienna's project at www.smartcity.wien.gv.at/site/en

Report: https://www.wien.gv.at/english/urbandevelopment/energy-planning/

**Graz:**

So far, Graz has launched five smart city projects, four of which were pilot projects. Previously, Graz integrated 12 buildings into one multifunctional building complex that boasts a zero energy balance. The "Cool City" project is currently in development, integrating new and old buildings into a rejuvenated smart quarter. Find out more online: www.smartcitygraz.at

**Salzburg:**

- The Smart City Masterplan, focused on ambitious Energy and Climate targets, was approved by the municipal council in 2012.
- With the pilot project "Stadtwerk Lehen" the city of Salzburg realized an optimized energy concept for an inner-urban area composed of both new and old buildings.
- An increase in the use of district heating and solar energy (by 35%) has significantly reduced primary energy demand and CO2-emissions (-80%).
- The Salzburg metropolitan area is the Austrian SmartGrids-Model Region, (SGMS). In Köstendorf, a suburb of Salzburg, the project encompasses 99 buildings with 43 PV plants, 36 registered electric vehicles and 5 PV storage systems.
- In order to secure and advance its progress on the forefront of Austria's Smart Cities movement, Salzburg developed a 2050 Smart City agenda in which it subscribed to expanding its carbon neutral energy consumption and production. Further, Salzburg strives to develop a efficient, consumer oriented smart public transportation system.

For further information please visit: https://www.stadt-salzburg.at/Internet/wirtschaft_umwelt/stadtplanung/smart_city.htm

## UPCOMING EVENTS CALENDAR

- July 21, 2016: Landinger Sommer—Smart Cities Day 2016 – Hinterstoder: http://2015.landinger-sommer.at/smart-cities-2015.html
- February 16-19, 2017: Bauen & Energie Wien And Aquatherm Vienna (combined) – Vienna: www.bauen-energie.at/en/
- March 1-3, 2017: World Sustainable Energy Days 2017 – Wels: www.wsed.at
- March 3-5, 2017: Expo Energy 2017 – Wels: expoenergy.eu
- May 9-13, 2017: Smart Grids Week 2016 – Linz: www.smartgridsweek.com
- May 10-12, 2017: Smart Automation Austria – Vienna: www.smart-automation.at/en/

## RESOURCES

CS Contact Info: Marta Haustein: marta.haustein@trade.gov

### CITY FACTS AND CONTACTS:

- Vienna: Population: 1.753 million
  Project Manager Smart City Vienna
  Contact: Ina Homeier; ina.homeier@wien.gv.at
- Graz: Population: 282,473
  Project Manager Smart City Graz
  Contact: Kai-Uwe Hoffer;
  stadtbaudirektion@stadt.graz.at
- Salzburg: Population: 148,400
  Project Manager Energy City Salzburg
  Contact: Kai-Uwe Hoffer;
  stadtbaudirektion@stadt.graz.at

## LINKS

- Federal Ministry of Transport, Innovation and Technology: www.bmvit.gv.at
- Climate and Energy Fund: www.smartcities.at
- Energy Innovation Austria:
  www.energy-innovation-austria.at
- Austrian Mobile Power:
  www.austrian-mobile-power.at
- Smart Grids Technology Platform:
  www.smartgrids.at
- Austrian Institute of Technology (AIT):
  www.ait.ac.at
- Smart Health Care: www.elga.gv.at
- Smart Buildings: www.Ha$erZukunft.at
- Sustainable Business Development:
  www.nachhaltigwirtschaften.at
- European Strategy for Smart Cities Technologies: www.tp-smartcities.at
- Energy management: www.e-connected.at
- Energy system development:
  www.energiesystemederzukunft.at
- Climate and Energy:
  www.klimaundenergiemodellregionen.at

# Brazil Smart Cities Guide

## BASIC DATA ON THE ECONOMY

GDP per capita (PPP; 2015): $15,800

Major urban areas: Sao Paulo - 21.066 million; Rio de Janeiro - 12.902 million; Belo Horizonte - 5.716 million

Population (July 2015): 204,259,812

Industries: textiles, shoes, chemicals, cement, lumber, iron ore, tin, steel, aircraft, motor vehicles and parts

## SMART CITY OVERVIEW

Brazil has experienced a rapid growth in cities over the past 50 years and today, 85% of the population lives in urban areas. Brazil's cities have experienced countless difficulties due to overpopulation, pollution, poverty and high crime rates. The emergence of Brazil as part of the high-growth BRIC (Brazil, Russia, India, China) countries in the early 2000s, led to foreign investment as well as a commitment by Brazil to improving infrastructure and adapting modern technologies to cities.

**SAO PAULO, Brazil**

Population Growth, 2013-2014:
**0.6%**

Total Employment, 2014 (Thousands):
**9,664 People**

Real GDP Growth 2013-2014:
**1.1%**

Employment Growth, 2010-2014:
**1.1%**

*Brookings Metro*

In 2013, the Brazilian communications ministry, MiniCom, announced the list of the 262 Brazilian towns and cities selected for the second phase of the Cidades Digitais (digital cities) program. The digital cities program aims to modernize municipal management through the integration of a telecommunications network in public buildings.

The Government has also been issuing tenders to various companies to build out infrastructure and services up and down the country. Brazil has numerous initiatives underway to adapt smart technologies including international partnerships.

In 2011, Rio de Janeiro collaborated with IBM for its smart city program. This resulted in the deployment of the company's smart city technology including an expansive command control center.

## KEY INITIATIVES (BY SECTOR)

### SMART CITIES

Accenture and Cisco recently renewed their partnership in Brazil, which will continue to serve the communications sector in the country. Cisco has been deploying its technology in Brazilian cities, most recently releasing the latest in its Wi-Fi project in a number of subway stations in Rio de Janeiro.

Águas de São Pedro is known as Brazil's first digital city, and with the backing of companies Telefonica Vivo and Ericsson, it has been building out its smart infrastructure, such as connected street lights and parking services.

In 2014, the São Paulo state's Public Security Department announced the launch of a system developed in partnership with Microsoft, named Detecta. The project was inspired by a similar initiative that has been in operation in New York since 2012 and is comprised of a big data solution, which integrates the police's intelligence headquarters with the thousands of phone calls received by their contact centers, video cameras spread across the city and the thousands of policemen patrolling the streets.

The historic city of Olinda located in the state of Recife, was selected in 2015 to be a part of the Open and Agile Smart Cities initiative, which will enable the implementation of an open-source standard known as FIWARE. This platform allows for the development of Smart City solutions based on data integration and openly accessible APIs.

### SMART TRANSPORTATION

As a recent report highlights, in 2013 alone, Rio de Janeiro and Sao Paulo lost $ 43 billion in productivity because of congestion, the equivalent of 2% of Brazil's entire GDP. Belo Horizonte, Rio de Janeiro and São Paulo have been recognized for putting into practice innovative and sustainable transport projects in the past year. Belo Horizonte implemented last year MOVE BRT, a 23-km Bus Rapid Transit (BRT) system, together with pedestrian-only streets and a 27-km cycling network.

### SMART ENERGY

Smart metering, focused on the electricity market is present in six Brazilian states, including São Paulo, Rio de Janeiro, Paraná and Amazonas, involving local providers. The objectives of these pilot projects are to create smart grid systems to help reduce waste and control consumption. One of the first improvements brought by the system was the new billing method of time-differentiating usage.

## UPCOMING EVENTS CALENDAR

Three Israeli companies won an international competition to help create a pilot smart city in Brazil to house 20,000 residents of low socioeconomic status.

Brazil is also considering various plans to connect the people of the rainforest, including pilots of Internet balloons, through Google Loon.

# Bulgaria Smart Cities Guide

## SMART CITY OVERVIEW

Bulgaria, strategically located in Southeast Europe, has numerous 'smart cities' projects that are beginning to gain popularity especially in Bulgaria's larger cities of Sofia, Plovdiv, Varna, Burgas, and Russe. Known worldwide for its high-speed broadband Internet, Bulgaria is also known to have the largest ICT sector in Southeast Europe which generates about 10% of the country's GDP.

Additionally, Bulgaria ranks first in Europe and ninth in the world for its prestigious ranking as a highly desirable 'outsourcing destination'. Outsourcing of IT and business practices have grown by double digits over the past four years and have generated Bulgarian export revenues of over 1 billion Euros per year.

Given the country's ICT focus, expertize and connectivity, the City of Sofia municipality developed an initiative to develop and provide, online to its citizens about 50 of the most commonly used services as Sofia makes a pledge to become a 'smart city'.

Bulgaria is one of six partner regions in the 'SMART+' project funded by the INTERREG IVC and financed by the European Union's Regional Development Fund designed to help Europeans work together and share innovative economic, environmental and risk-prevention practices.

## KEY INITIATIVES (BY SECTOR)

### SMART TECHNOLOGY

Priority development of high-speed broadband access to develop the infrastructure for broadband Internet in 29 municipalities and 24 small settlements with low levels of broadband penetration:

In the town of Chelopech, a mining company implemented a network sensor technology designed to increase its production of gold from half a million to two million tons annually, while also increasing quality without increasing any additional resources.

Smart metering: EVN Bulgaria, (an electricity company) will invest 34.8 million Euros over three years to deploy 373,000 smart meters in its service area.

Additionally, ADD Bulgaria Ltd. will develop and implement smart metering systems for electricity, water, gas and street lighting as part of the *Advanced Metering Infrastructure*.

Note: A recent report predicts that Bulgaria and other CEE Europe countries will collectively spend $10.3 billion on smart meters over the next ten years, as each takes its path toward meeting its EU mandates.

### SMART MOBILITY

An 'Intelligent Transport Systems Project' and a 'Sustainable Urban Transport' project are being developed in seven of Bulgaria's major cities: Sofia, Plovdiv, Burgas, Ruse, Varna, Pleven, and Stara Zagora.

### SMART ENERGY

Bulgaria is among the few European countries that have announced achievement well in advance of the objectives of the "Europe 2020" strategy on renewable energy. There are over 500 renewable energy projects in operation in Bulgaria, however, Bulgaria needs a long-term, sustainable strategy model -- beyond 2020.

### SMART GOVERNENCE

Bulgaria's 'E-government Strategy 2014-2020' aims to introduce effective business models in establishing effective digital administrations, and in establishing coordinated planning and implementation of all e-Governance development initiatives.

Bulgaria has a need to effectively coordinate the policies of all municipalities' administrative services and the electronic services they want to provide, and e-Government issues between the Ministry of Transport, IT and Communication and the Ministry of the Interior in reference to the issuance of 'electronic identity' documents.

### SMART ENVIRONMENT

There is an effective and successful 'Green Public Procurement' project financed by the European Commission and implemented by Bulgaria's National Association of Municipalities.

## FEATURED CITIES AND/OR PROJECTS

**SOFIA:**

The city of Sofia is recognized as a leader of new technologies in the fields of ICT, creative industries and tourism. Promoting an 'Innovation Strategy for Smart Specialization of Sofia' (ISSS) program which outlines the city's economy in accordance with the development of scientific research and innovations. The program is developed in conformity with the *Europe 2020: A Strategy for Smart, Sustainable and Inclusive Growth* and the National Development Plan – Bulgaria 2020. The' smart' specialization' has a positive impact on sectors that are directly related to the quality of life in the city, such as the environment, transportation infrastructure, mobility, healthcare, and social services.

Bulgaria is planning to launch fifty administrative e-services for citizens and enterprises. This project is supported by the Operational Program Administrative Capacity and co-funded by the European Social Fund. The project "Sofia—Smart and Innovative City"- aims to examine the specific needs and problems of the city in the following aspects: Smart Economy, Smart Mobility and Smart Environment.

**Burgas:**

The city is creating a 9.3m Euro intelligent transport system called "Integrated City Transport of Burgas" to make public transport safe, efficient and convenient. The project will provide real-time information for passengers and will introduce integrated ticketing and video surveillance on Burgas's public transport system to reduce ticket fraud.

Burgas is the 45th signatory to the Green Digital Charter (GDC), a EUROCITIES-led initiative that promotes the use of ICT solutions to reduce cities' emissions and encourage the greening of municipal ICT equipment

**Dobrich:**

The city is part of "PLEEC: Planning for Energy Efficient Cities." This recently completed project developed a general model for energy efficiency and sustainable city planning. Being one of eight European cities in the *Imagine 2050 Roadmap Project f*unded by the EU European Regional Development Fund (ERDF) and the INTERREG IVC Program to include the implementation and development of GIS for management and control of under- ground infrastructure. Dobrich has implemented a GIS system of geodetic surveying, digitizing and processing of data necessary for the development of cadastral maps and records of underground pipelines. The city also plans to allow electric car drivers to park free in special 'blue' zones in a move to reduce traffic emissions and encourage sustainable transport.

**Plovdiv:**

In 2019 will be designated the European Capital of Culture. The city offers:

- Internet platform and interactive map on the city's infrastructure
- Live web cams throughout the city
- Internet-based public transportation maps
- Online registration of local taxes
- E-platform for kindergarten applicants
- Online registration of pets
- Online system to monitor real time noise
- Smart phone based parking payment
- Online investment portals
- Portals for public consultation

- Online platforms for the local initiatives
- An iUrban software that allows for the evaluation of energy consumption
- A "smart city" project to boost energy efficiency and cut industrial waste in Trakia Economic Zone (TEZ); This is being developed with Germany's Fraunhofer Institute and China's Huawei)

## UPCOMING EVENTS CALENDAR

April 5-7, 2017: SEE Smart Cities Conference and Exhibition at the International Expo Center – Sofia
www.viaexpo.com

## RESOURCES

Commercial Service: Peter Delin:
peter.delin@trade.gov

# Canada Smart Cities Guide

## BASIC DATA ON THE ECONOMY

2015 GDP per capita (PPP: 2015): $45,600

Population: 35,099,836 (July 2015 est.)

Industries: Transportation equipment, chemicals, processed and unprocessed minerals, food products, wood and paper products, fish products, petroleum, and natural gas.

## SMART CITY OVERVIEW

Canada is one of the most 'wired' countries in the world with nearly 92.9 % of Canadian households connected to the Internet (in 2014) and 84 % of the population, roughly 29.5 million people in 2014, with access to a cell phone.

Canada has been on the forefront of smart cities growth, with most of the initiatives coming from a provincial level. Toronto hosted the 2015 Intelligent Community Forum, and is seen as one of the innovators in smart cities.

A recent study, the Smart Prosperity Goals[56], highlights Canada's vision for adopting smart and clean technology. By the 2020s, Canada's envisions that their cities and rural communities will rank among the world's most improved on metrics of sustainability and livability and will get there by using smart, compact urban design; improved green services such as mass transit and bike lanes; higher building efficiency standards; more green spaces; and incentives for rural land stewardship.

Canada is also looking towards sustainable infrastructure, and the government has committed to a $60 billion investment in Canada's infrastructure.

## KEY INITIATIVES (BY SECTOR)

The federal government has demonstrated public support for further deepening connectivity and on April 8, 2016, the Minister of Innovation, Science and Economic Development announced an investment of $34.5 million to increase Internet access for over 65,000 rural homes across the country.

The City of Toronto has recently allied with Chicago-based Internet of Things management firm Cityzenith in order to better manage the mounds of raw data cities collect daily. The aim of this budding alliance is to help major urban centers navigate their massive datasets in order to come up with data-driven solutions to make cities more responsive to the needs of citizens and businesses.

In May 2015, the city of Montreal announced the Montreal Action Plan that includes 70 projects that will turn Montreal into a "smart city." The total allocated budget of $23 million is broken down into six sections and is targeted for completion by the end of 2017. Apart from ensuring a fast fiber network, "unleashing municipal data," and the rollout of "intelligent transport systems" that will bring your real-time info on your subway/bus/car service, the city plans to deploy free Wi-Fi.

Toronto is one of the municipalities embracing the idea of solving transportation issues by working with startups. In early October 2015, the city held TrafficJam, a hackathon that invited entrepreneurs to come up with ideas for beating gridlock. The

[56] http://www.smartprosperity.ca/sites/default/files/documents/spexecsummary-final.pdf

idea was a decided shift away from previous approaches.

### SMART WATER

Ontario is global R&D leader in water technologies. About 900 established and 300 early-stage water technology companies operate in the province, many doing business worldwide. UV disinfection technology developed by Trojan Technologies (now owned by Danaher) has been installed at 7,800 municipal facilities in more than 80 countries.

### SMART TRANSPORTATION

Transport Canada has used two infrastructure-related funds for spending on intelligent transportation projects. About $921,000 has been provided to the City of Surrey to install an intelligent transportation system and to the provincial government in Ontario to improve traffic flows along key highways and roadways and at border crossings.

The Montreal Smart and Digital City Strategy 2014-2017 plans for a smart mobility program where all transit data will be provided in real time for an intermodal and integrated transportation system.

### SMART ENERGY

Across the country, there is increasing awareness of the need for a smarter electrical grid system, and both the public and private sectors are contributing toward that goal.

- In May, The Smart Grid conference was held by GE in Montreal to discuss global innovations in smart grid technology.
- In 2012, the Standards Council of Canada published "The Canadian Smart Grid Standards Roadmap" a strategic planning document designed to enable manufacturers, municipalities, and other organizations to operate under a shared set of technical standards. Developed by a committee of more than 20 public and private sector experts, the Council noted the nature of this emerging technology — and the necessity of it for economic development and support for Canadian businesses.
- In the past, Canadian factories heavily relied on coal for their power generation needs but are now embracing advanced electric grid technologies. The province of Ontario has recently transitioned to a "coal free" electric grid.

### SMART BUILDINGS

Canada is leading the way in smart infrastructure with an increased awareness across the country regarding the benefits of smarter electrical grid systems, by bringing utility electricity delivery systems into the 21st century using computer-based remote control and automation.

The Telus Tower at 25 York St. in Toronto's south financial core has become the first north of the U.S. border to employ a LEED Dynamic plaque. It will be installed by U.S. technology firm Honeywell Building Solutions with the support of the United States Green Building Council and Canada Green Building Council. This technology works to prominently displaying the building's up-to-the-minute performance across five categories – energy, water, waste, occupant transportation and human experience – the plaque will help Telus Tower occupants and building managers monitor things such as resource usage and carbon footprints.[57]

## FEATURED CITIES AND/OR PROJECTS

The Intelligent Communities Forum (ICF) recognized three Canadian communities to be among the seven most intelligent communities in the world: Winnipeg (MN), Toronto (ON), and Kingston (ON)–not because they have implemented the most advanced technology, but because they have adopted a culture of collaboration and co-operation in pursuit of prosperity and opportunity for all.[58]

[57] http://www.theglobeandmail.com/report-on-business/industry-news/property-report/new-smart-building-technology-to-take-pulse-of-telus-tower/article24877401

[58] http://canadablog.cisco.com/2014/04/23/canada-smart-city-movement-is-taking-off/

**Montreal:**

The Smart and Digital City Initiatives Surrey, British Columbia. Canada's third fastest growing city welcomes 1,000 new residents each month and has adopted the Smart Surrey Strategy.

**TORONTO, Canada**

Population Growth, 2013-2014:
**1.5%**

Total Employment, 2014 (Thousands):
**3,137 People**

Real GDP Growth 2013-2014:
**2.6%**

Employment Growth, 2010-2014:
**1.9%**

*Brookings Metro*

**Toronto:**

The city won the 2014 Intelligent Community of the year by the ICF for extensive use of the Internet of Things for transportation, buildings, healthcare and tourism. Toronto Strategic Initiatives 2013-2018

## UPCOMING EVENTS CALENDAR

September 12-16: ro Walk Pro Bike Pro Place – Vancouver, BC

November 14-18, 2016: 1st Canadian German Conference on Smart Cities – Vancouver, BC

May 15-17 2017: Global Public Transportation Summit – Montreal

## KEY ORGANIZATIONS

- Canada Green Building Council
- ICLEI Canda
- InnoCiteMtl
- Institute of Electrical Engineers
- Municipal Information Systems Association of Canada
- Smart City Alliance

# Chile Smart Cities Guide

## BASIC DATA ON THE ECONOMY

GDP per capita (PPP; 2015): $23,500

Major urban areas: Santiago - 6.507 million; Valparaiso - 907,000; Concepcion - 816,000

Population (July 2015): 17,508,260

Industries: copper, lithium, other minerals, foodstuffs, fish processing, iron and steel

## SMART CITY OVERVIEW

Chile stands out as one of Latin America's most stable economies, making it an attractive place to do business in the region. A hotspot for innovation and doing business, the Chilean capital of Santiago was named the #1 smart city in Latin America by Boyd Cohen in 2013. Various government and non-government agencies are working to promote and support smart cities projects in Chile. These include non-profit foundation Pais Digital, Chilean Economic Development Agency (Corfo), and the Ministry of Transport and Telecommunications.

## KEY INITIATIVES (BY SECTOR)

### SMART TECHNOLOGY

The Government of Chile's Digital Agenda 2020 plan includes projects related to improving connectivity, providing online access to government services, growing Chile's digital economy, and increasing digital competency through education. The government hopes to connect 90% of households to fixed broadband, provide public Wi-Fi access in 90% of neighborhoods, and have Internet access in 100% of public schools by 2020.[59]

### SMART INFRASTRUCTURE

Chile is ranked number ten in the world in LEED certification, with 318 registered projects, of which 111 have obtained LEED Certification, including 41 Silver LEED, 47 Gold LEED and 3 Platinum LEED. Chile ranks 18th, the best ranked emerging country, according to Dow Jones Country Sustainability ranking. The public consciousness of sustainable practices and support for investments in green infrastructure, engineering and construction is high. In 2012, Chile signed the Inter-Ministerial Agreement for Sustainable Construction, to align several initiatives from the Ministries of Public Works, Housing & Urbanism, Energy, and the Environment.

### SMART ENERGY

Currently, about 10% of Chile's energy is generated from non-conventional renewables such as wind, solar, and small hydro. The government is working toward a policy goal of 20% non-conventional renewables by 2025. Solar parks are the most sought after projects as Chile's Atacama Desert has the most favorable irradiance conditions in the world. Chile is also working to draft a new law to promote the use of energy efficient technologies.

### SMART TRANSPORTATION

- Santiago's extensive and efficient metro system has the highest per capita use in South America. The city also has a strong cycling community, with some separated bike lanes.
- Some communities have implemented bike sharing programs, including a recent collaboration with B-Cycle (a U.S. Company) and Banco Itau.

[59] www.agendadigital.gob.cl

- The largest energy company, Chilectra, is starting a pilot to support an EV car-sharing program, which would be the first of its kind in Latin America.
- The Ministry of Transportation has been testing several smart solutions including variable automated toll pricing on the highways and using sensors to track traffic congestion.

## CHALLENGES

The Government of Chile has drafted a new data privacy bill, which, if enacted, may have some implications for cross-border data flows.

## FEATURED CITIES AND/OR PROJECTS

**Start-Up Chile:**

The Start-Up Chile program began in 2010 and offered high potential global start-ups a $ $40,000 equity-free investment. As a result, Santiago was recently ranked amongst the top 20 cities for its entrepreneurial ecosystem.

**Smart City Santiago:**

Smart City Santiago is a business park and smart city prototype where several projects are tested. Projects include electric transport, consumption telemetry, domestic automation, photovoltaic generation, electricity grid automation, intelligent street lighting (LED), remote monitoring and free Wi-Fi. The project is sponsored by Chile's largest energy company, Chilectra.

**Fiber Optic Austral:**

Chile's government will invest $100 million in a 3,000 km submarine fiber optic cable connecting the main cities in the south of Chile. Chile's Telecommunications Subsecretariat expects to publish an open bidding notice for the project concession by the end of 2016.

## UPCOMING EVENTS CALENDAR

- September 7-9, 2016: Trade Winds Latin America business forum – Santiago
- October 19-22, 2016: Aquasur, a trade show focused on aquiculture and the fishing industry will take place – Puerto Montt
- November 9-11, 2016: IFT Energy, a trade show focused on energy, including renewable energy and energy solutions for the mining sector will take place - Antofagasta
- November 16-18, 2016: COMAD 2016, a Sustainable Wood Construction Technology trade show will be happening – Concepcion
- November 29 – December 2, 2016: Expo Naval, a Naval and Maritime trade show will take place – Vina del Mar
- May 15-19, 2017: Exponor, a mining industry focused trade show will take place – Antofagasta

# China Smart Cities Guide

## SMART CITY OVERVIEW

Over the past two decades, China's urbanization rate has increased dramatically, from 31% in 1995 to 55.6% in 2015. This trend it set to continue. According to the National New-type Urbanization Plan (2014-2020), the country's first official plan for urbanization, the number of permanent urban residents will reach 60 % of the population by 2020. Given this population shift from rural to urban, China aims to speed up the process of transforming its cities so that they can absorb the inflow of people.

**BEIJING, China**

Population Growth, 2013-2014:
**0.23%**

Total Employment, 2014 (Thousands):
**14,321 People**

Real GDP Growth 2013-2014:
**0.77%**

Employment Growth, 2010-2014:
**2.1%**

*Brookings Metro*

China's 13th Five-Year Plan (FYP) reveals that the country aims to optimize urban space through public transportation, high-capacity infrastructure, mixed-use development and green city planning. This will spur smart cities development with greater use of low-carbon technology and new energy systems.

As part of this effort, the Chinese government has proposed multiple "100 million people" projects, including:

1. Granting urban residency to around 100 million people with rural household registration and other permanent urban residents
2. Encouraging around 100 million rural residents to live in local towns and cities in the central and western regions
3. Creating businesses to provide new urban residents with more employment opportunities
4. Rebuilding both rundown areas and "villages" in cities, affecting roughly 100 million people.

With the urbanization of an additional 300 million residents, Chinese cities are focusing on smart city technologies such as green buildings, building energy retrofitting, building management systems, green data centers, energy efficiency technologies, clean air and clean water technologies, waste treatment technologies, and smart grid and green transportation systems to help alleviate the challenges that mass urbanization presents in China. In this respect, policy-makers are looking urgently for ways to let cities continue to offer migrants a better life while at the same time, economic planners are pushing hard to transform China from the world's export factory to a self-sufficient modern service economy. As such, smart city technologies are an emerging collection of technologies cutting across industries to address the problems and development priorities of cities.

## KEY INITIATIVES (BY SECTOR)

The 12th FYP, which guided broad economic policy through 2015, specifically targeted smart city technology as a sector to be strengthened. Investment in Chinese smart cities is expected to exceed 1.6 trillion Yuan in the coming years.

Ministries such as the National Development and Reform Commission (NDRC), the Ministry of Industry and Information Technology (MIIT) and the Ministry of Housing and Urban and Rural Development (MOHURD) are jostling to sponsor programs and industry alliances. In 2012, the Ministry of Science and Technology (MOST) organized the China Strategic Alliance of Smart City Industrial Technology Innovation. In 2013, the Ministry of Industry and Information Technology (MIIT) sponsored another group, the China Smart City Industry Alliance, and this year announced a 50 billion Yuan ($8 billion) fund to invest in smart city research and projects. A third group, the Smart City Development Alliance, was formed this spring by the NDRC. Some companies are working with only one of these new groups, and some are involved with all three.

## CHALLENGES

For international companies, huge opportunities in China are tempered by real challenges:

### GOVERNMENT PROTECTION:

The local government market is opaque, and smart city applications sometimes involve areas – digital mapping, for example – that is considered sensitive for non-Chinese firms. US firms in particular face increased scrutiny in the wake of the Congressional investigation of Huawei, the revelations of global NSA surveillance from whistle-blower Edward Snowden, and the US Justice Department's move to name five members of the Chinese military to its most-wanted list for cyber-attacks against US companies. This last move has provoked several countermeasures from China, including the banning of Microsoft's Windows 8 from government offices and the reported phasing out of IBM servers from Chinese banks. The recent announcement from the State Information Office that it would be testing the security (as yet undefined) of foreign information technology products and services, and barring those that do not pass, only further underscores the difficulties that international firms may face in China.

### MATURING DOMESTIC COMPETITION:

- The most significant challenge may be China's rapidly maturing domestic competition. China is no longer a developing-nation market in which international companies compete only with one another. In typical fashion, Chinese firms have been adept at mastering technologies and shaking up markets, often by offering low prices.
- China's two electric grid companies, State Grid and Southern Grid, as well as all three of China's major telecoms, are actively developing smart grid policies and products and sponsoring pilot projects.

## FEATURED CITIES AND/OR PROJECTS

In January 2013, the Ministry of Housing and Urban-Rural Development (MOHURD) formally announced the first list of national pilot Smart Cities. By April 2015, there were over 285 pilot Smart Cities in China, as well as 41 special pilot projects. There are no laws and regulations directly governing Smart Cities in China. The Chinese government has, however, introduced a number of guidance notices:

- Notice to Speed up the Project Implementation of Smart Cities;
- National New Urbanization Plan (2014-2020); and
- Guidance on Promoting the Sustainable Development of Smart Cities.

Below is a shortlist of some of the designated Smart Cities by MOHURD and MOST.

| | First Batch | Second Batch | Third Batch |
|---|---|---|---|
| 1. | Beijing | Urumqi | Jiamusi |
| 2. | HunNanXinQu | Yinchuan | Tonghua |
| 3. | Wuhai | Lanzhou | Tangshan |
| 4. | Dezhou | Xianning | Huhehaote |
| 5. | Taizhou | Guiyang | Datong |
| 6. | Nanjing | | Germu |
| 7. | Suzhou | | Zhangye |
| 8. | Podongxinqu | | Zhongwei |
| 9. | Zhenhai | | Jingzhou |
| 10. | Xianning | | Tianshui |
| 11. | Nanping | | Hanzhong |
| 12. | Canshanqu | | Kaifeng |
| 13. | Pingxiang | | Xuzhou |
| 14. | Wudangqu | | Haozhou |
| 15. | Tongren | | |
| 16. | Lecong | | |

*For more information on the City List and Program, please refer to MOHURD's announcement in Chinese.*
http://www.mohurd.gov.cn/zcfg/jsbwj_0/jsbwjjskj/201504/t20150410_220653.html

## OPPORTUNITIES

Government policies and the recent announcements from MOHURD indicate a growing market in China with significant opportunities for exporters of "smart city" technology, products and services. Such opportunities include:

### CONSTRUCTION:

- Architecture, design and city master planning;
- Engineering and efficiency consulting;
- Technology for more efficient and cost effective building;
- Green building materials, systems and equipment.

### SMART SYSTEMS:

- Smart Transport: real-time monitoring, transferring and analyzing, Internet of cars
- Smart Water: pollution treatment, water quality testing and monitoring, waste recycling
- Smart Energy: meter and remote monitoring, energy saving, new energy transfer
- Smart Healthcare: operations and management (e-records), wearable devices, remote medical treatment, medicine e-commerce platforms

# Colombia Smart Cities Guide

## BASIC DATA ON THE ECONOMY

GDP per capita (PPP; 2015): $13,800[60]

Major urban areas: Bogota - 9.765 million; Medellín - 3.911 million; Cali - 2.646 million

Population (July 2015): 46,736,728

Industries: textiles, food processing, oil, clothing and footwear, beverages

## SMART CITY OVERVIEW

Columbia can be seen as a leader and model for smart cities in Latin America. With a large urban population and cities like Medellín and Bogotá labeled as world class smart cities, Colombia has great potential to be a leader in the smart city projects. In 2015, 76.4% of Colombia's population lived in urban centers, with a 1.66% annual urban growth rate. As of 2014, 52.4% of the population had Internet access.[61]

Medellín and Bogotá have been highlighted as two of the "smartest cities in Latin America" based on the 28 indicators of the Smart City Wheel.[62] Medellín has taken large strides forward on the stage of global smart cities. The city has been highlighted in the Spanish publication El Confidencial and praised by Nobel Prize winning economist Joseph Stiglitz for its social inclusion and non-segregation based development model.[63] Bogotá boasts large scale improvements in its sustainable transportation infrastructure, exemplifying a world class bus system and practicing car-free Sundays.

## KEY INITIATIVES (BY SECTOR)

### SMART ECONOMICS

**The Medellinnovation District** will transform the northern part of Medellin into a hub for entrepreneurs and other institutions focused on the knowledge economy. As part of this project, the Great Pact for Innovation combines efforts by universities, the government, and the private sector to increase investments in innovation to 2% of the city's GDP by 2018. The urban and economic transformation project hopes to make Medellin Latin America's capital of innovation by the year 2021.[64]

### SMART INFRASTRUCTURE

**Medellín Ciudad Inteligente (Smart City Medellín):** One of over 50 government sponsored city improvement programs, this project focuses on citizen participation, open government, social innovation, and sustainability. The program provides information and communication technology infrastructure, and conducts courses on the subject, for some of Medellín's lowest income residents. This has helped the city become a new hub for technology and innovation.[65]

[60] All basic data is from the CIA World Factbook: https://www.cia.gov/library/publications/the-world-factbook/geos/co.html

[61] https://www.cia.gov/library/publications/the-world-factbook/geos/co.html

[62] http://www.fastcoexist.com/3022533/the-8-smartest-cities-in-latin-america?partner=rss&utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+fastcoexist%2Ffeed+%28Co.Exist%29

[63] http://www.investincolombia.com.co/news/756-spain-newspaper-el-confidencial-highlighted-medellin-as-colombia-s-smart-city.html

[64] Description: http://smartcities.ieee.org/news-bulletin/january-2015/ieee-smart-cities-initiative-affiliate-city-profile-medellin-colombia.html
Project website: http://medellinnovation.org/

[65] http://www.americasquarterly.org/content/medellin-smart-city

## SMART HEALTHCARE

Buen Comienzo (Good Start): This project allows low income mothers-to-be free access to the Internet, improving knowledge regarding health issues and medical information, reducing the need for doctor's appointments. The project provides free wi-fi and classes to expectant mothers who once had to travel long distances to visit a doctor.[66]

## SMART SUSTAINABILITY

**The Emerging Sustainable Cities Initiative (ESCI):** Inter-American Development Bank's non-reimbursable technical assistance program to address key roadblocks preventing sustainable development in urban areas across Latin America. The three pillars of the program are (i) environmental and climate change sustainability, (ii) urban sustainability, and (iii) fiscal sustainability and governance. The project begins by addressing four Colombian cities: Barranquilla, Bucaramanga, Manizales, and Pereira, and eventually moves on to eleven other Colombian cities.[67]

## FEATURED CITIES AND/OR PROJECTS

**Bogotá:**

- In 2013, Bogotá was the first Latin American city to host the Smart City Expo, showcasing the innovative nature of the city.[68] The event included an international congress to tackle the development of smart cities globally and the use of technology to sustainably improve citizens' livelihoods.[69]
- Since 1998, the city has been moving toward a system of sustainable transit. The city has 300 km of bike lanes, in addition to the TransMilenio buses, which run three times as fast as a typical New York City bus, have led to a 40% decrease in vehicular traffic within the city.[70]
- On car-free Sundays, 121 kilometers of streets in the city center are transformed into space for people to bicycle and spend leisure time.[71]

**Medellín:**

- Medellín has experienced a huge transformation from one of the drug capitals of Latin America to one of the most forefront smart cities in the region. Medellín is now ranked the 7th Smartest City in Latin America.[72]
- Medellín has invested extensively in a metro system that is large for a city of its size. A system of gondolas connects hillside communities with the center of the city.
- Projects like the Medellín Ciudad Inteligente and Mi Medellín and the creation of the Medellinnovation District highlight some of the reasons Medellín was ranked 2013 Innovative City of the Year by Citi and the Wall Street Journal.

[66] http://www.americasquarterly.org/content/medellin-smart-city

[67] http://www.iadb.org/en/topics/emerging-and-sustainable-cities/cities-using-a-sustainable-urban-development-approach,6693.html

[68] http://en.investinbogota.org/bogota-first-venue-smart-city-expo-2013-latin-america

[69] http://www.smartcityexpo.com/en/press/-/prensa/detalle/1521855/samrt-city-bogota

[70] http://www.dac.dk/en/dac-cities/sustainable-cities/all-cases/transport/bogota-more-bikes-and-buses-fewer-cars/

[71] https://info.bbva.com/en/news/disciplines/technologies/innovation/smart-cities-latin-america-sustainability-progress-together/

[72] http://www.fastcoexist.com/3022533/the-8-smartest-cities-in-latin-america?partner=rss&utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+fastcoexist%2Ffeed+%28Co.Exist%29

# Croatia Smart Cities Guide

## SMART CITY OVERVIEW

Development of Smart City infrastructure in Croatia is at the initial level, but is progressing fast. About 50% of the Croatian cities have already started a process of implementation of one or few smart solution projects. Currently, the Association of Cities is trying to raise the awareness of the Smart Cities concept and is seeking for the government support to use dedicated EU funds for the project developments called Horizon 2020—Smart Cities. Implementation of the LED street lighting projects, focused on the reduction of electricity consumption in street lighting, has already commenced. Obstacles in the implementation of the processes are finances, as well as understanding and accepting of the Smart Cities concept by the city authorities.

## KEY INITIATIVES (BY SECTOR)

### SMART TECHNOLOGY

It is estimated that by 2020, 50% of the population will have ultrafast access to the Internet which will be more than 100Mbps, while others will have an average speed of 30Mbps. Croatian Government fully supports EU initiative Digital Single Market and has established a Council for Digital Market Implementation. Government spending for the ICT in the period 2015-2020 will focus on the following: e-Administration, e-Taxation, e-Health, e-Education and development of the government's platform.

### SMART BUILDING

Energy renovation of public buildings within the concept of "Smart Cities" is the framework by the Croatian government for the Smart Building process implementation. There are several local projects being implemented and supported by the local municipalities with the following smart building concepts: indoor climate, LED lighting ventilation, smart grid, smart meters, and energy saving devices

### SMART HEALTHCARE

To date, about 2,400 primary healthcare teams in all 20 counties in Croatia have been connected into the network. The e-Health project includes e-booking, e-reporting, e-prescription and referrals to be sent directly to pharmacies and labs/ hospitals. Most of Clinical Centers and Hospitals have implemented individual Hospital Information System with e-Health Records.

### SMART GOVERNANCE AND EDUCATION

The Croatian government has established service centers for the e-Citizen, e-Health, e- Invoice, e-Identity, e-Permit, e-File, but it still has no clear strategy for integration of central and local government institutions. The e-Education project is established and offered by the Ministry but still many schools are not integrated in that offered platform. Central data center for public data integration is in the establishing phase.

## CHALLENGES

The following items were categorized by the Croatian public for further improvements in order to make Smart City friendly environment in Croatia:

- e-Commerce
- Effective implementation of consumer protection policies and e-Governance
- Improvement of mail delivery system
- Abolition of geo-blocking
- Local digital market reform
- Modernization of copyright
- Cross-border broadcasting revision
- Taxation and VAT harmonization
- Telecom operators' revision
- Revision of audio visual services

- Improvement of Internet platforms
- Revision of personal data protection law
- Cybersecurity
- Freedom of EU data flows

## FEATURED CITIES AND/OR PROJECTS

**Dubrovnik:**

Dubrovnik is Smart City #1 in Croatia. It is the only city with clear smart city strategy project. Project called Dubrovnik 2020—Smart City was designed by the local development agency DURA. The project includes smart technologies concepts. The scope of the project includes water and energy savings processes using smart IoT solutions. This project should be completed in 2020.

**Opatija:**

This is a small city with a few initiatives, but still important. Project "Opatija optical ring" anticipates construction of 16 km of fiber optics network with 19 Wi-Fi Hotspots and 14 webcams.

**Zagreb:**

ePayment for parking, transport tickets and various student services was implemented. Open data portal project to consolidate local government services with municipality and public services. ePolice implementation emerged from of eSecurity project, anticipated establishment of an operation communication center in every Croatian city. Every policeman will have a camera on the uniform and police cars will be equipped as offices.

**Rijeka:**

The iURBAN project will address increasing market demands for cheaper and cleaner energy services. It is being designed with direct involvement of end users - local residents, energy companies and public administration. Rijeka aspires to become the Croatian Center for Competence for Smart Cities. i-Locate project the "virtual hub" and the "toolkit" in the context of public health, private and public services with the involvement of real users and stakeholders within thirteen pilots' sites in eight EU countries.

**Zadar:**

Project FIESTA is for energy efficiency in households. It is a project for intelligent traffic systems—an integration of intermodal traffic and logistics with use of electrical bikes and scooters.

**Šibenik:**

Project Inavis—establishes a green center for Adriatic region. UrbEco project— electrical public transportation and investing in electricity charging stations through the city.

## UPCOMING EVENTS CALENDAR

- November 2016 (day TBD): Smart Cities Conference: Implementation of smart city projects – Zagreb; http://lider.media
- March 2017 (day TBD): Smart Government Conference: Disruptive Innovations through Smart Solutions – Zagreb; http://lider.media
- April 2017 (day TBD): Smartcity StartUps Conference – Dubrovnik; http://cityos.io

## RESOURCES

CS: Suzana Vezilic: suzana.vazilic@trade.gov

## KEY ORGANIZATIONS

- Croatian Association of Cities – The Association of Cities of Croatia
  Website: http://www.udruga-gradova.hr/
- Croatian Chamber of Commerce— IT Association
  Website: http://www.hgk.hr/category/sektor-centar/sektor-industrija
- HAMAG—BICRO – Croatian Agency for SMEs, Innovations and Investments
  Website: http://www.investcroatia.hr/
- The Ruder Boškovic Institute – Croatian center for advanced materials and nanotechnology,
  Website: http://www.irb.hr
- E-Croatia – Central State Administrative Office
  Website: https://uprava.gov.hr/o-ministarstvu/ustrojstvo/uprava-za-e-hrvatsku/1080

# Czech Republic Smart Cities Guide

## SMART CITY OVERVIEW

Smart City is a relatively well-known term in the Czech environment. Each major city and number of municipalities in the country have already one or more smart solutions and actively work on further projects in accordance with their budget possibilities. Politicians on all levels declare support to smart city initiatives but general awareness is still not as high as in the Western European countries or in the United States. The net- work of Czech and Slovak cities CIVINET as a part of CIVITAS Forum is an active player in overcoming barriers between local and EU level and effectively helps to streamline the process of drawing funds allocated by the EU for smart city development. These financial resources combined with smart city enthusiasm and projects of particular cities create a tremendous opportunity for interested companies for years to come.

## KEY INITIATIVES (BY SECTOR)

### SMART MOBILITY

The government approved a massive modernization of transportation systems. By 2020, about $1 billion will be spent on smart systems in air, rail, ship and road transport. About one half of the resources will be invested in radars, cameras, automatic scales and advanced electronics for road transport. The purpose is to make traffic flow smoothly without accidents and to sanction undisciplined drivers quickly and effectively.

### SMART GOVERNANCE

Since 2012, basic public electronic registers work reliably in the country. The registers are cornerstones for further e-Government innovations, as they speed up and simplify everyday life of citizens and companies that also gained a thorough control over access to their private information. Government initiatives aim at deeper information sharing among public authorities. The program of Digital Education counts with cheaper or free Internet for underprivileged starting in 2017.

### SMART ENERGY

The approved government strategy counts with building new nuclear power plants combined with renewable energy support. The intended Smart Grids construction is essential for reliable operation of the energy network. Grids in the future will also be used by consumers-producers, partially contributing power with their home-made solar energy. Energy efficiency plans count towards significant household consumption reduction by 2020.

### SMART LIVING

In the Czech Republic, only 6% of houses have a smart installation compared to 40% in the western countries. Smart living belongs to the most dynamically expanding branches promising great opportunities as it gets more into public awareness. 88% of families planning to build a house in the next 5 years consider smart living technologies.

### SMART TRAMS

Prague introduced first smart trams that enhance passenger safety by automatic braking in curves. The trams also display an electronic map including exact location of the vehicle with transfer options, points of interests and street names. In winter months, passengers appreciate an automatic temperature regulation. This smart system is supposed to be installed in all tram vehicles by 2018.

## CHALLENGES

See the European Union section.

## FEATURED CITIES AND/OR PROJECTS

**Prague:**

Prague is a pioneer among Central European metropolises in supporting electro- mobility in cooperation with energy suppliers in its territory since 2011 and is the fourth best e-Government city after Seoul, Hong Kong and Madrid. The SMART Prague 2014-2020 concept addresses city's weaknesses by strengthening research, technological development and innovation, promoting social inclusion and combating poverty, sustainable mobility and energy savings and education and learning.

**Pilsen:**

Smaller city with ambitious smart city plans.

- Free Wi-Fi in public spaces project launched, covering so far two major city parks.
- First electric buses in operation.

**Brno:**

Sensors installed on parking places send information on availability to central database available online. At the same time, sensors improve parking fee enforcement by the City Police. The city launched a car-sharing project Emuj.cz allowing people to enjoy advantages of using a car without ownership concerns and compulsory expenditures. The vehicles available for sharing include the small and handy Peugeots iOn electric. The decision to provide electric cars instead of gasoline ones aim at improving air quality in the city.

## UPCOMING EVENTS CALENDAR

- December 2016: Smart City Brno – Brno; http://www.top-expo.cz/smart-city/smart-city-2016
- May-June 2017 : Smart City Symposium – Prague; http://scsp2016.fd.cvut.cz
- 2016 Conference Partners: EATIS, University of Maryland, University of California, University of Santa Barbara, University of El Paso.

## RESOURCES

Commercial Service: Hana Obrusnikova: hana.obrusnikova@trade.gov

# Denmark Smart Cities Guide

## SMART CITY OVERVIEW

Denmark is one of the leading European nations in working with Smart City initiatives. In particular the cities of Copenhagen and Aarhus are far along in implementing these initiatives. In 2014, CEDI, a consultancy firm advising public authorities, prepared the report: "Smart City in the Danish Municipalities: Status and Initiatives" for the Danish Ministry of Urban and Rural Affairs. The report was based on a survey directed towards city managers from the 98 municipalities in Denmark. Out of 98 respondents, approximately 50 % responded that they work with Smart City activities, and 80 % answered that they would ramp up these activities in the coming years. In addition, the international consulting firm Arup assessed in 2016 that Denmark has potential to become an international frontrunner within Smart City movement, if nation-wide collaboration is prioritized.

**COPENHAGEN, Denmark**

Population Growth, 2013-2014:
**0.67%**

Total Employment, 2014 (Thousands):
**1,515 People**

Real GDP Growth 2013-2014:
**1.28%**

Employment Growth, 2010-2014:
**0.5%**

*Brookings Metro*

## KEY INITIATIVES (BY SECTOR)

### SMART ENERGY

Recently, a test facility, Danish Outdoor Lighting Lab, has opened outside Copenhagen with the objectives of creating energy savings and more intelligent indoor and outdoor lighting. This test facility is important as Danish municipalities face a need to replace streetlights in the coming years. For instance, Copenhagen is about to replace 20,000 streetlights with LED lighting as a mean to meet the city's goal to become carbon-neutral by 2025. In addition, the city of Albertslund has planned to re- place 8,000 streetlights over the next 10 to 15 years.

### SMART HEALTHCARE

Denmark is constructing sixteen new hospitals, including eight new "super-hospitals". Between 20 and 25 % of the of the project's $ 7 billion budget is expected to allocated to technology implementation. The new "super-hospitals" are titled as such as they will encompass state-of- the-art health IT structure. These hospitals are built in collaboration with multiple stakeholders, including specialized international companies. The new hospitals are expected to be completed by 2020.

### SMART GOVERNMENT

The current E-Government strategy for 2011-2015 has enabled Denmark to take important steps in improving the digitalization of communication between citizens and the public administration. The main areas in this strategy include: 1) no more printed forms of letters, 2) digital welfare, and 3) digital solutions for closer collaboration. The new E-Government strategy 2016-2020 is in process. This strategy will leverage on the already achieved results from the current E-Government strategy for 2011-2015. The themes in the new digital strategy include 1) a productive and efficient public sector, 2) public services must create value for citizens and businesses, and 3) public digitalization must support business growth.

## CHALLENGES

See the European Union section.

## FEATURED CITIES AND/OR PROJECTS

**Copenhagen:**

The vision of Smart City Copenhagen is to become a carbon neutral city by 2025 "Copenhagen Connecting" draws attention to the use of big data collected from cell phones, GPSs in busses and sensors in garbage bins, and the sewage system to meet the municipality's objectives of reducing traffic congestion, air pollution, and carbon emissions. Smart City initiatives include transportation, cycling lanes, the harbor bath, water management, and wind power in Middelgrunden. Copenhagen has entered into partnerships with both Cisco and Hitachi, and has won the World Smart Cities Award in 2014 in the Best Project category for its Copenhagen Connecting project.

**Aarhus:**

The city of Aarhus launched "Smart Aarhus" in 2012. This is based on building partnerships to find effective and sustainable solutions. The vision of Smart Aarhus is to be an internationally leading, Scandinavian model for urban development based on partnerships. The city of Aarhus has launched various projects including Internet Week Denmark, Open Data Aarhus, and Digital Neighborhood. The core of the activities of Smart Aarhus lies the inclusion of various stakeholders, such as citizens, to create the best public services.

**Albertslund:**

The city of Albertslund has dedicated the entire industrial area "Hersted Industry Park" to Danish Outdoor Lighting Lab (DOLL). DOLL is a partnership between local authorities, private companies, and research institutions. DOLL is Denmark's new platform for developing future LED lighting. Living Lab, in the city of Albertslund, tests lighting, operating systems, and Smart City technologies in a 1:1 scale.

## LINKS

Aarhus University Smart Cities: http://smartcities.au.dk/ and au@au.dk

Local Government Denmark: http://www.kl.dk/English and kl@kl.dk

Copenhagen Solutions Lab: http://cphsolutionslab.dk and connect@cphsolutionslab.dk

State of Green: https://stateofgreen.com/en and info@stateofgreen.com

CLEAN: http://www.cleancluster.dk and info@cleancluster.dk

Sustainia: http://www.sustainia.me and sustainia@mm.dk

## RESOURCES

Commercial Service: Aleksander Moos – aleksander.moos@trade.gov

# European Union Smart Cities Guide

## SMART CITY OVERVIEW

Nearly three quarters of the European Union's 503 million inhabitants live in urban areas. As a result, cities in the European Union (EU) face many environmental, societal and economic challenges including congestion, pollution, increasing energy costs, and adapting community services to meet the needs of an ageing population. Throughout the EU, many municipal governments and other stakeholders are seeking out new technologies to provide interconnected and environmentally sustainable products and services. For example, there is a particular interest in intelligent transport systems, such as multimodal mobility programs and the use of smart technology for parking and traffic control. This trend presents many interesting opportunities for U.S. companies.

The U.S. Commercial Service at the U.S. Mission to the EU works to help U.S. companies navigate the policy and regulatory framework in the EU by providing market insights. We can help you to develop a sound EU export strategy in terms of regulations and standards. If you have not done so already, we encourage you to contact your local U.S. Export Assistance Center (USEAC). They can connect you with our offices located in over 80 countries worldwide, including the EU office located in Brussels, Belgium. A directory of the domestic offices can be found here: http://www.export.gov/usoffices/index.asp.

## KEY INITIATIVES (BY SECTOR)

### SMART ECONOMY

**The Circular Economy:** The purpose of the Circular Economy is to maximize the efficient use of resources and eliminate waste from all economic sectors. Waste collection and water treatment is a basic service provided by municipal governments in the EU and around the world. Municipalities are looking to smart technologies to increase the efficiency of the provision of these services thereby eliminating waste. The technologies municipal governments need extend from smart Outage Management Systems (OMS) to Geographic Information Systems and Mobile Workforce Management (MWFM). These platforms allow municipalities to have real time visibility on the location of service outages and the location of their work force. This gives managers increased efficiency when dispatching and coordinating the movements of their teams to work sites thereby improving timeliness, worker productivity while reducing resource consumption (i.e. fuel) and waste. The Circular Economy proposal does not mandate that municipal governments procure smart technologies for the provision of water and waste collection services. However, it does raise awareness among local officials about how technology can improve the provision of these services in a cost effective manner.

### SMART TECHNOLOGY

**Digitization and the Digital Single Market:** Digitization is at the heart of cities becoming more intelligent through management automation, network connectivity, data analytics, cyber security and interoperability. A number of digital regulatory initiatives deriving from the digital single market strategy and others will greatly influence the development of Smart Cities and the way U.S. business accesses this growing market. An illustrative and non-exhaustive list of relevant regulatory initiatives/legislations would include:

- Data-related policies: data protection (General Data Protection Regulation), data security (Network and Information Security Directive), draft online content delivery directive, the upcoming Data Flows Initiative, potential legislation of platforms and apps;

- Device/networks-related legislation: broadband/5G, cloud computing, interoperability and ICT standardization;
- Artificial intelligence, supercomputing.

For more information, visit: http://ec.europa.eu/digital-agenda/.

On April 14, 2016, the European Parliament approved the General Data Protection Regulation (GDPR) to create a more consistent data protection regime across Europe. The GDPR will have a two year implementation phase and replaces the current Data Protection Directive. Key points include new requirements for data processors, expansion of the geographic scope of EU data protection law, revision of the definition of personal data, and implementing a much higher standard for consent.

For more information on the GDPR, visit: http://ec.europa.eu/justice/data-protection/reform/index_en.htm

## SMARTH HEALTHCARE

**E-Health:** E-Health will play an important role in the Smart Cities initiative. The European Commission's Directorate General for Communications Networks, Content and Technology (DG CONNECT) and the United States Department of Health and Human Services (DHHS) have cooperated closely in this field in recent years. In 2010 the groups launched a Memorandum of Understanding (MOU) on this topic under the auspices of the Transatlantic Economic Council. As part of the MOU, the two sides agreed to work on an EU-US e-Health/Health IT Roadmap (hereafter "Roadmap") to strengthen transatlantic cooperation in eHealth (European term) and Health Information Technologies (Health IT, U.S. term for the same sector).

The Roadmap initially focused on two high priority areas:

- Standards Development: DG CONNECT and DHHS – through the Office of the National Coordinator for Health IT (ONC) – worked to develop an action plan for deployment of an International Patient Summary that uses internationally recognized standards to support transnational interoperability;
- Workforce Development: DG CONNECT and ONC have developed a tool to identify skills needed for the workforces in Europe and the US to be able to effectively use Health IT.

Under the framework of the Transatlantic Economic Council, CS-EU, DHHS/ONC and DG CONNECT are working to update the Roadmap. The first Roadmap was originally published in 2013, the next update will be the third edition.

For the current update, it was agreed to add a third work-stream on innovation in the e-Health/ Health IT industry. It will include pilot projects to further spur deployment of E-Health/ Health IT technologies. These would foresee concrete initiatives directly handled by local authorities. DHHS and DG CONNECT launched two consultations in late 2015, and CS-EU is engaged with DG CONNECT to ensure U.S. business interests are properly reflected in the final text of the Roadmap. The information from the consultations will inform the revised Roadmap, which will likely not be ready for publication until sometime in summer 2016.

## SMART ENERGY

**Energy and Smart Grids:** Energy infrastructure is one of the most fundamental and strategic components of any city. High-density city populations require smart energy solutions i.e., both highly efficient and sustainable systems with economic and social benefits. Smart grids provide demand based electricity via continuous monitoring of current and voltage to individual and industrial consumers including water, transportation and public health facilities. Relevant EU initiatives are as follows:

- 2011/463 Communication on Smart Grids: from innovation to deployment
- 2012/148/EU: Commission Recommendation of 9 March 2012 on preparations for the roll-out of smart metering systems
- Directive 2012/27/EU on energy efficiency
- Directive 2014/94/EU on the deployment of alternative fuels infrastructure

- Commission Recommendation of 10 October 2014 on the Data Protection Impact Assessment Template for Smart Grid and Smart Metering Systems
- Smart Grid Task Force: advises the European Commission on the development and deployment of smart grids

### SMART INNOVATION

**European Innovation Partnership on Smart Cities and Communities (EIP SCC):** With the support of the European Commission (EC), the European Innovation Partnership on Smart Cities and Communities (EIP SCC) is an initiative designed to bring together city leaders, industry, financial institutions, researchers, and other relevant smart cities stakeholders. The initiative seeks to accelerate the development and deployment of smart city solutions at the intersection of the energy, transport/mobility, and ICT sectors. The EC officially launched the EIP SCC in a Communication published on July 10, 2012 (COM(2012)4701) which laid out the implementation phases and governance structure of the initiative.

Within this framework, interested stakeholders were to submit an application (also known as a Commitment) to join the EIP SCC supporting its objectives. A Commitment is an intention to provide a measurable and concrete engagement in support of one or more focus areas, linking energy, transport and ICT in the urban context. In all, 443 commitments were submitted by groups of stakeholders, public and private sectors, of which 371 were selected as eligible. More information about EIP SCC initiative and how to get involved can be found here: http://ec.europa.eu/eip/smartcities.

## SMART SUSTAINABILITY

**European Standardization - Smart and Sustainable Cities and Communities:** Ongoing standardization efforts in the EU tackle the different elements of Smart Cities (transport, efficiency, etc.), and the CEN-CENELEC-ETSI Coordination Group 'Smart and Sustainable Cities and Communities' (SSCC-CG) fulfills a coordination role with planning and monitoring activities on identifying overlaps and gaps of standards for smart cities. For more information, you can visit: http://www.cencenelec.eu/standards/Sectors/SmartLiving/smartcities/Pages/SSCC-CG.aspx

### SMART INNOVATION

**Horizon 2020:** Horizon 2020 is a research and innovation fund launched by the European Commission. For the period of 2014 to 2020 it seeks to distribute close to -80 billion. Funding for Horizon 2020 projects is provided through various funding instruments, each specifying different terms, conditions, funding rates, and requirements depending on the purpose and type of funding granted.

The U.S., as a non-EU country, is not automatically eligible for funding under the Horizon 2020 fund. As a principle, U.S. participants are expected to provide their own funding for projects; the EU therefore encourages potential U.S. participants to contact research and innovation funding organizations in the U.S. to support their participation in Horizon 2020 projects.

Funding, however, may be awarded to U.S. researchers and other participants in certain cases where a project is open to worldwide participation and funding, is deemed essential by the European Commission, and/or when EU funding is provided due a reciprocal agreement between the U.S. and the EU which also provides European participants with the ability to receive funding in the US.

If a project is funded under Horizon 2020, a grant agreement document, governing the basic terms and conditions for project financing, must be prepared and signed by the participants, the European Commission, and the project coordinator.

It should be noted that participants from third countries, including the U.S., which do not receive funding, may still be subject to the grant agreement as "beneficiaries not receiving EU funding" and must nonetheless sign and adhere to most, if not virtually all, of the conditions and obligations contained in the grant agreement.

### SMART TRANSPORTATION

**Intelligent Transport Systems:** The Intelligent Transport Systems (ITS) Directive (2010/40/EC),

adopted by the EU on July 7, 2010, establishes a framework for the coordinated deployment of interoperable ITS within the EU Member States and across borders. Within this framework, the EC is required to first adopt specifications and request the development of standards for the Priority Areas included below to ensure the compatibility, interoperability and continuity in the deployment of ITS in the EU. These specifications can include functional, technical, organizational, and/or service provisions. Subsequently, EU Member States, in their efforts to deploy ITS applications and services, must ensure that the specifications adopted by the EC are correctly applied.

Within this framework, the development of functional, technical, organizational, and/or service specifications that ensure compatibility, interoperability and continuity is ongoing. In early 2014, the EC created a Connected Driving (or C-ITS) platform to develop policy recommendations and a common vision of the interoperable deployment of automated and connected vehicle technology. The EC plans to develop a master plan on the deployment of C-ITS in the second half of 2016.

The EC launched a new high level group for the automotive sector known as 'GEAR 2030' in January 2016. One of the group's tasks will be to consider a roadmap for the deployment of autonomous vehicles in the EU. The group consists of 25 members including member state ministers of economy, industry, and transport, EU umbrella associations and federations from the automotive industrial value chain (e.g. ACEA and CLEPA), ICT associations, network operators and digital services associations active in area of connected, automated and/or autonomous vehicles, trade unions, academia and civil society organizations.

In the transport sector, the EC issues mandates to the European Standardization Organizations (ESOs) for standards to be developed and eventually adopted under the relevant EC Directives:

- M/338 on Electronic Fee Collection in support of Interoperability of electronic road toll systems in the Community
- M/453 on Co-operative systems for Intelligent Transport in the field of information and communication technologies to support interoperability of cooperative systems for intelligent transport in the European Community.

A database of these standardization requests can be found here: http://ec.europa.eu/growth/single-market/european-standards/requests/index_en.htm.

All of the standards adopted under the ITS Directive can be searched here: http://www.cen.eu/work/areas/transport/ITS/Pages/default.aspx.

For general information about the ITS initiative, visit: http://ec.europa.eu/transport/themes/its/index_en.htm.

## CHALLENGES

There are several government-to-government and business-to-government dialogues between the United States and the European Union that can provide a forum for companies to raise market access concerns. Before providing context and details about potential market access challenges in the European Union, we want to highlight at least two bilateral initiatives that could help make a difference for U.S. firms.

**The U.S.-EU SME Cooperation:**

Since 2012, Commerce has been a leader and an innovator in transatlantic SME cooperation activities: working with our counterpart agency within the European Commission, collaborating to enhance support for SMEs by leveraging existing resources, sharing best practices and increasing opportunities for matchmaking and networking among B2B, B2G and G2G. This work has been carried out under an SME cooperation arrangement between the U.S. Department of Commerce and the EU's DG GROW that has shifted into new territory in 2016, with SME matchmaking and best practice exchange programs at two major trade shows – the Consumer Electronics Show and Hannover Messe. For more information, contact Lori Cooper at lori.cooper@trade.gov.

**The U.S.-EU Cluster Cooperation:**

In addition to the SME cooperation activities, in April 2015, Commerce advanced support for SMEs by signing a Clusters Cooperation Arrangement with DG GROW, to facilitate matchmaking and collaboration between U.S. and European clusters and to exchange best practices on policy initiatives to support the development and growth of clusters. Deputy Secretary Andrews signed the MOU on behalf of the U.S. Department of Commerce. Since then, a link appears on both the U.S. Cluster Map and Registry Portal and the European cluster map websites, which means that European clusters can register and be featured on the U.S. map and vice-versa. This information makes it easier to search for potential partners across the Atlantic. For more information, contact Tshanda Kalombo at tshanda.kalombo@trade.gov.

Following the success of the DOC-EEN matchmaking pilot program at Hannover Messe (involving over 70 U.S. SMEs, Clusters and state EDOs) plans are underway for a similar scale DOC-EEN matchmaking program at Smart Cities Barcelona in November 2016. Both the SME and Clusters Cooperation Arrangements are featured prominently in the T-TIP SME Chapter as part of the U.S.-EU ongoing cooperation to increase trade and investment opportunities for SMEs. Other bilateral cooperation includes dialogues between the U.S. and the EU in the areas of Smart Cities, ICT, Health IT/e-Health, smart grids, e-vehicles, etc.

## MARKET ACCESS CHALLENGES IN THE EU

The market access challenges for U.S. exporters in the EU, especially for goods and services related to Smart Cities, can roughly be placed into the categories of access to participation in pilot projects, regulations, and technical standards. Within each category the challenges can also be further sorted according to the level of government where they occur: the EU-wide level, the Member State level, and/or the local level. Not all such barriers are written into legislation but they exist and therefore are invisible until U.S. companies actually encounter problems when attempting to export into the EU, then the gaps and barriers in the system become real.

Over time, the Office of the European Union[73] has heard from U.S. companies trying to export innovative products into the EU, especially small and medium sized enterprises (SMEs) that they often encounter these "invisible barriers". By definition, goods and services related to Smart Cities tend to be innovative. However, the EU's regulatory and standards systems are not set up to expedite market access for these types of products; a more detailed explanation below describes the interaction among those regulations and standards. Even when there are EU policies and program support to expedite research to market innovations, they are geared towards enabling European companies, not necessarily inclusive of U.S. companies.

U.S. participation in projects funded by the European Commission: Funding at the EU-wide level is done mainly through Horizon 2020, a research and innovation program which provide nearly €80 billion over 7 years (2014 to 2020. Horizon 2020 promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market.[74] The program's Pillar 2, Industrial Leadership, aims to finance the path for industrial projects to move from the research phase to the demonstration phase. Many Smart Cities projects in the EU, from pure research to pilot projects (including test beds for automated vehicles), are funded through Horizon 2020. The benefits of participating in these projects can be both tangible and intangible, such as providing participants with data/testing results that will provide the basis for new regulations and standards of the new technology plus the opportunities to collaborate with local governments to identify and address future procurement needs. In some Member States, the lack of local funding for Smart Cities projects means that local authorities only engage in projects that receive Horizon 2020 funding.

[73] The Office of European Union (OEU) is a part of the Global Market Unit in the International Trade Administration, U.S. Department of Commerce. OEU policy staff collaborate with colleagues in the Commercial Service, both domestic and overseas, to help U.S. firms export to the European Union. For more information about market access issues and Smart Cities in the EU contact Ann Ngo ann.ngo@trade.gov

[74] https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020

Therefore, it is even more crucial for U.S. firms to participate in such pilot projects. However, there are some limitations and barriers to U.S. participation in these projects.

In general, with some exceptions, U.S. participants are expected to provide their own funding if they want to participate in Horizon 2020 projects. First, the EU encourages potential U.S. participants to contact research and innovation funding organizations in the U.S. to support their participation in Horizon 2020 projects. Second, U.S. applicants must demonstrate that without their contribution the project would not succeed and that no European researcher is able to make the same kind of contribution to the project. Third, even when U.S. participants find a way to justify their participation, some may still decline to proceed when they discover that the terms and conditions of Horizon 2020 are not favorable, reasonable, or somehow incompatible with their organizational mandates. The EU's statistics show a noticeable decline in U.S. participation between the Framework Program 7 (FP 7) during 2007-2013 -- the predecessor program to Horizon 2020 -- and the first two years of Horizon 2020. For example, in the health sector, where conditions are more open for U.S. participation, 182 U.S. organizations participated in 139 projects funded by €52.6 million under FP7. Under Horizon 2020 as of publication, two years into the six-year program, there have been 31 U.S. organizations participated in 28 projects funded by €9.2 million.[75]

The Department of State is presently negotiating a memorandum of understanding with the European Commission that will provide additional flexibility for independently-funded U.S. organizations that seek to cooperate with European institutions receiving Horizon 2020 funds. This effort could possibly reach a positive conclusion in the form of an agreement by the end of 2016. However, until that time, this particular barrier remains.

In addition to EU-wide funding with Horizon 2020, each Member State also has its ownnational-level funding program for research and infrastructure projects. Depending on the Member State, the terms and conditions for the participation of U.S. organizations may or may not be favorable. Ultimately, however, local authorities have an important role to play in which Smart Cities project they wish to pursue. Therefore, U.S. companies would most likely need to team up with local European partners in order to participate in these types of Smart Cities projects.

**Regulatory:** Besides access to pilot/demonstration projects, another set of barriers facing U.S. exporters are European regulations. The three categories of European Union law that have binding force are regulations, directives, and decisions. Regulations are EU-wide and are binding on Member States to apply and enforce. Directives indicate the required results to be achieved but leave the implementation details to the individual Member States. Differences in national interpretation can lead to uneven implementation of Directives. Decisions may be applicable to a Member State, an organization, or an individual within the European Union and are only binding upon the individual or institution to which they are directed. The linkage between regulations and standards that affect market access for U.S. products is discussed more fully in the section below on technical standards.

The EU's Digital Single Market strategy is one example of EU-wide policies that would have widespread impact on Smart Cities products and services. For example, the European Commission's Digital Single Market strategy includes a formal commitment to help EU member countries develop cross-border eHealth services by the end of 2017. The Digital Single Market strategy will impact the "digitization" of industry, ICT standards and related issues such as geo-blocking (the restriction of access to services, preferential prices, product offerings, etc., based on geographic location), the role of Internet platforms, and copyright-related proposals addressing cross-border access to digital content.

**Technical Standards:** Another set of potential market access barriers facing U.S. exporters of Smart Cities goods and services lie in the domain of technical standards. The key to

[75] "Transatlantic S&T Cooperation in Health: Current, Emerging, and Potential for Cooperation" DG Research and Innovation, European Commission, 2016

understanding how the EU regulatory system operates is the concept of essential health and safety requirements. Essential requirements are identified in the EU New Approach Directives in order to ensure that the risk of accident is limited. It is important to note that all manufacturers, domestic or foreign, must demonstrate that they meet all the essential requirements pertaining to their product. However, products meeting European standards, called European Norms (EN), have a far less burdensome path to market. For innovative products, there often may be no applicable existing EN standards. Therefore, the burden of proof to demonstrate compliance with essential requirements can be overwhelmingly onerous and time-consuming, assuming the company can find certified labs to test its products.

EU Directives/Regulations identify the form of conformity assessment procedures that must be followed in order for a product to be placed on the market. If an EN standard (i.e., a European standard) is used and the level of risk from the product is low, then typically the producer may use a self-declaration of conformity – this is true regardless of the nationality of the producer in question -- as long as an EN standard is used. If a product presents a higher level of risk, such as a medical device, then it must be certified by a third party.

When European industry decides it needs a new standard, it will work on a text, and may even adopt a standard that will be revised to fit the Commission's mandate once it is available. The draft standards begun under the EN process are not typically available to the public at large at this stage, but only to the members of the European Standards Organization (ESO), which usually are only representatives of European companies.

There are many cases where the introduction of an EN standard has eliminated market access for U.S. companies that were previously able to work with Member State national standards bodies to assure their product meets the necessary health and safety standards. Many market access cases involving EU standards hinge on gaps in the system that keep the U.S. producers from being able to prove that their products meet the health and safety requirements of an EU Directive. To prove they meet EN standards would require additional testing in each Member State, which would cost time and money – an obstacle not easily overcome by SMEs.

It is difficult even for a large multinational to correctly identify which EU directives/regulations and EN harmonized standards are applicable to its product. This process is further complicated when a very sophisticated product is covered by several different EU laws. Again, it is up to each individual company to identify which EU legislation is applicable to its product. There is no official EU sponsored service to assist companies as they work through this very complicated process. This process is even more daunting for SMEs that lack the resources and time to commit to this process. Furthermore, manufacturers that produce products that are not covered by a New Approach Directive may face resistance from customers in the EU, as the customers will often request a CE Mark even when there is no applicable directive, because it is perceived by the market as a requirement.

# Finland Smart Cities Guide

## SMART CITY OVERVIEW

Finland has a strong position in smart governance – project planning, execution and management. The country boasts a number of successful smart living related projects. Finland's smart cities approach is human-oriented, open, and involves the development of both smart cities and smart services. Competitive advantages include extensive cooperation between the public and private sectors, and a well-functioning innovation system. The environment invites experimentation in urban inventions and retrofitting operations in old neighborhoods, as well as new smart city development projects. There is a healthy balance between big and small players in the development of Finnish smart cities.

## KEY INITIATIVES (BY SECTOR)

### SMART TECHNOLOGY

The Helsinki Region Infoshare (HRI) http://www.hri.fi/en/ service aims to make regional information quickly and easily accessible to all. Essentially, HRI is a web service with more than 1,000 datasets for fast and easy access to open data sources between the cities of Helsinki, Espoo, Vantaa and Kauniainen. The data published is mainly statistical, giving a comprehensive and diverse outlook on different urban phenomena, such as living conditions, economics and well-being, employment and transport. A good proportion of the data material offered by the service is GIS based.

Helsinki is a hotspot for integrating smart and clean solutions into the city structure and the everyday lives of people living in the city. Smart'n'Clean http://www.smartncleanfi/ showcases development projects that make sustainability a reality. The content is collected by Helsinki Business Hub. The criteria are that projects should fall thematically under smart and clean solutions and geographically in the Greater Helsinki Region. Categories include: Built environment, energy efficiency, energy systems, material efficiency, sustainable consumers, traffic and transportation, waste and recycling.

### SMART BUILDING

The Smart Kalasatama initiative develops Helsinki's Kalasatama area into a world-class model district of smart urban development, http://en.uuttahelsinkia.fi/kalasatama . Smart Kalasatama does not rely on a single technology or scheme, such as a smart power grid or renewable energy. Instead, the area will be developed via a holistic approach to Smart Cities. In addition to intelligent infrastructure, other essential ingredients of smart urban development are viewed to include agile service development, open inclusion of various stakeholders, as well as innovative utilization of open data.

### SMART INFRASTRUCTURE

The Six City Strategy – open and smart services is a strategy for sustainable urban development carried out by the six largest cities in Finland: Helsinki, Espoo, Vantaa, Tampere, Turku and Oulu. The primary objective is to strengthen Finland's competitiveness by using the country's six largest cities as innovation development and experimentation platforms. The strategy has three focus areas: Open innovation platforms, open data and interfaces, and open participation.

### SMART TECHNOLOGY

One key goal of Helsinki's Smart City activities is to harness the innovative capabilities of the entire urban community by promoting cooperation between application developers, and the rest of the city's ICT ecosystem. To achieve this goal, Forum Virium Helsinki is actively supporting the City of Helsinki with initiatives such as Open

Ahjo, Helsinki Loves Developers, Apps4Finland, CitySDK, and Code Fellows http://forumvirium.fi/en/smartcityinnovationunit

## CHALLENGES

One challenge and opportunity in Finland's Smart Cities environment is the high level of development and competence among domestic (Finnish and European) players. At the same time, there is ample room for cutting edge technologies and solutions from the U.S. that can offer unique advantages or complement home grown solutions. Finland is an open and competitive environment for business.

## FEATURED CITIES AND/OR PROJECTS

**Tampere:**

Finland's largest inland city, offers a prime example of urban development. Vuores, its new district, will be close to nature yet technically and ecologically advanced. Vuores, to be built by 2020, is one of the most exciting new urban development projects in Finland. The streets and parks of Tampere's new green district will have LED lighting, its buildings will have high-speed data network, and a pneumatic system will handle its waste. http://www.tampere.fi/english/vuores.html

**Jyväkylä:**

Jyväskylä's main development project combines ambitious zoning, intelligent urban planning and new municipal engineering. The district of Kangas will be a pioneer in resource efficient infrastructure. It will be built into a cyber secure area and its ICT infrastructure is based on future projections. The area is partly energy self-sufficient, the fiber networks are reliably maintained and the sensor data is stored safely. Kangas is going to be the most cyber secure area of the most stable country in the world. Kangas is will have homes for some 3,000 people and workplaces for 2,000 by 2025. The district is located less than a kilometer from the center of Jyväskylä in an area dominated by a defunct paper mill. http://www3.jkl.fi/blogit/kangasjyvaskyla/

**Oulu:**

The City of Oulu is a forerunner Smart City. Smart Oulu includes a 3D Internet, 5G network development, smart housing, health intelligence, printed electronics, environmental technology and creative applications of wireless technology. Hiukkavaara Arctic Smart City is an example of Integrative Urban Development Concept – INURDECO – and an important part of Oulu's effort to attract new business investments. The area will set an international example for northern city planning and construction and will be a technology showcase for private and public operators.

**Helsinki:**

**Energy Efficient Premises:** No other office building in Finland requires as little energy as Viikki Environment House in Helsinki, which was completed in September 2011 and used by Helsinki's Environment Center and its University. Total energy consumption is only half the amount set in the national construction code. The building is also highly cost efficient; net- zero energy building related extra construction cost was only 3-4%. The public works department of the City of Helsinki managed design and construction. http://www.hel.fi/www/ymk/en/centre/environment-house/

## UPCOMING EVENTS CALENDAR

October 17-19, 2016: International Mindtrek Conference/Smart City Event – Tampere; http://www.mindtrek.org/2016/smartcity/

## LINKS

Helsinki Forum Virium: http://forumvirium.fi/en/member-and-network-services/upcoming-events

Tekes Witty City Program: http://www.tekes.fi/en/programmes-and-services/tekes-programmes/witty-city/

Sitra, The Finnish Innovation Fund:
http://www.sitra.fi/en

Ministry of Transport and Communications:
http://www.lvm.fi/en/home

VTT Technical Research Center of Finland
http://www.vttresearch.com/

## RESOURCES

Commercial Service: Mia Maki –
mia.maki@trade.gov

# France Smart Cities Guide

## SMART CITY OVERVIEW

The concept of "Smart Cities" is gradually becoming considered as an integral part of national environmental politics. Over fifty cities in France have implemented varying degrees of smart city initiatives. These initiatives are extremely numerous but remain very much regional, as most projects are drafted and implemented at the local level. Cooperation at a national level remains limited and should be better organized to regroup and trigger various initiatives countrywide. As Mayor of Paris, Ms. Anne Hidalgo states "Urban growth and climate change experienced across the world results in considerable issues regarding energy management, waste management, mobility and logistics". This proves that French politicians are aware of the importance of the emergence of smart cities, and understand the political significance of supporting their development.

**PARIS, France**

Population Growth, 2013-2014:
**0.5%**

Total Employment, 2014 Thousands):
**6,408 People**

Real GDP Growth 2013-2014:
**0.8%**

Employment Growth, 2010-2014:
**0.2%**

*Brookings Metro*

## KEY INITIATIVES (BY SECTOR)

### SMART GOVERNANCE

Lack of transparency, unclear and unequal access to information has pushed France to the forefront of smart governance innovation. Examples of goals set by the government to remedy these problems include new in- formation systems like new communication tools between municipal services and the citizen (such as a hotline). Smartphone applications also enable direct access to information delivered by the municipality as well as access basic services.

### SMART ENERGY

Smart energy is often the most important aspect in the field of smart cities in the minds of local decision makers. Since 2013, France has concentrated on the development of smart-grids. A smart grid includes smart meters, smart appliances, renewable energy resources, and energy efficiency resources. Between 2015 and 2016, ERDF (The French electricity distribution company) plans to install 3 million smart meters across the country, with a total of 35 million running by 2020. The European Commission requires 80% of meters to be "smart" by 2020, to allow users to control their consumption. ERDF implemented the "Linky" project, to improve the functioning of the electricity market help control energy demand and reduce CO2 emissions.

### SMART TECHNOLOGY

Devices equipped with "near field communication" technology (NFC, CCP in French) are becoming more and more common in France and worldwide. This enables the communication between electronic devises. Present and anticipated applications include contactless transactions, data ex- change and simplified set up of more complex communications such as Wi-Fi. Internet penetration is 99.3% of the country's territory but is only 35.5% penetration rate for high-speed Internet (superior to 512 kilobits per second).

### SMART MOBILITY

France has concentrated on smart mobility through technologies such as common tickets for all means of transportation. There also has been a diversification of means of transportation in French cities with the development of personal public transport (PTT), such as bicycle or car sharing systems. Autonomous vehicles are also being tested, such as driverless public buses in the city of La Rochelle. Carpooling is spreading in France with 30% of drivers utilizing carpools (most often utilizing Blablacar, a ride sharing service). The

development of a multimodal information system will also eventually enable the optimization of transport choice.

## CHALLENGES

See European Union section.

## FEATURED CITIES AND/OR PROJECTS

**Lyon:**

Lyon's first focus as a smart city is developing smart mobility. Optimod'Lyon, an integrated platform for innovation on urban mobility and for public-private cooperation on urban ITS, is a good example of a successful project. It includes tools such as an urban freight navigator, a data collection system for delivery and parking areas, and a traffic prediction tool. Other transport initiatives include Citylog and Geovelo. The district La Confluence is one of the biggest urban redevelopment projects in Europe. It was designed to be environmentally efficient and friendly; smart and sustainable. It houses various environmental initiatives like highly efficient buildings (HQE), the creation of an urban heating net- work, the use of biomass and solar energy, the anticipation and sharing of produced energy. Lyon is also implementing various smart energy pro- jects and the Urban Community of Lyon is considered by many to be at the forefront of smart grid experimentation in Europe. Lyon Confluence also focuses on the expansion of Lyon's transport network with the construction of a tramway.

Inaugurated in September 2015, Hikari is a set of positive energy buildings in the heart of Lyon. It is the first district in France to produce more energy than it consumes. The project combines offices and housing in three buildings to optimize energy consumption. With photovoltaic panels on the front and on the roofs and its cogeneration rapeseed oil, the area consumes less than half the current average. The cooling requirements are covered by a machine producing ice water from the heat of the CHP and the cold of the water table. A geothermal system is also involved in drawing cooling freshness in the river Saône.

**Issy-les-Moulineaux:**

Issy's main project is IssyGrid through which electricity consumption can be controlled. Issy will also soon experiment with new ways to facilitate parking and all kinds of travel. The Zenbus application - which allows seeing in real time on your Smartphone the movements of the TUVIM (local buses) - is the first step and the reflection continues with all the stakeholders. Applications to find an on-street parking space with Parkeon or to share private parking spaces with Be Park are being implemented. Open data is also shared through the platform issy.com.

**Paris:**

- The city of Paris focuses on smart governance through the implementation of an e-petition system and a website for Parisians dedicated to sharing ideas about the city's projects (idee.paris). Local officials also focus on transparency and publish the city's service providers' data. The city's budgetary and social data is also avail- able on the Internet. Firms involved in the development of smart urban construction such as JC Decaux also work for the opening of data in order to organize new transportation services for Parisians (i.e. new applications for smartphones).
- The Internet of Things participates is the foundation for this technological development with the current installation of 100 bus shelters equipped with interactive screen offering proximity services.
- A new way of parking was tried out in the autumn of 2015, in partnership with the Ile de France Region, with the implementation of about 50 Intelligent Presence Sensors on delivery, taxi and disabled parking spaces in the Bercy district.
- The city of Paris also wants to install Wi-Fi throughout Parisian public spaces within the next few months.
- Paris has been an important actor in smart mobility projects with the development of Velib

and Autolib, two successful bicycle and car-hire programs. Ile de France is also equipped with several waste-to-energy plants. 50% of Paris, including the Louvre museum, is heated by three waste-to- energy plants in St Ouen, Issy-les Moulineaux and
Ivry sur Seine.

**Nice:**

- Nice's "Autobleue" program was the first large- scale 100% electric car sharing service to be launched in France (2011).
- Two smart grid projects are currently in development in Nice: the REFLEXE (Réponse de Flexibilité Electrique - Electrical Flexibility Response) pioneering project and Nice Grid.
- Nice also created two eco-districts: Saint-Martin- du-Var (with a particular focus on energy and carbon saving) and the Cap Azur eco-district (with an emphasis on renewable energies and the limitation of energy needs in buildings).
- Nice is also a leader in the field of smart government with the installation of two virtual city halls installed in the heart of Nice at the Etoile shopping mall in 2013 and at the Leclerc Saint-Isidore mall in 2015.
- Committed to a process of improving public services for local residents, the Nice Côte d'Azur Metropolitan Area and the City of Nice have joined forces with technology leader Cisco to launch the first 'virtual city hall cabin'.

France is undergoing a start-up renaissance driven by a new generation of entrepreneurs. It is home to vibrant tech hubs and a hotbed of talent, infused with a strong entrepreneurial culture. Programs such as "La French Tech," a slogan shared by French startups and the French government, support this trend. In addition, the recently inaugurated City of Connected Objects in Angers has for a purpose to make France a world leader in the field and will contribute to smart city development. Other initiatives include the Investment for the Future program and the EcoCité program, which promote a holistic approach to the smart and sustainable city through intelligent urban planning.

## UPCOMING EVENTS CALENDAR

November 8-9, 2016: Intelligent Buildings Systems and Smart Grid-Smart City– Paris Porte de Versailles; "http://www.smartgrid-smartcity.com/

## RESOURCES

Commercial Service: Rose-Marie Faria:
rose-marie.faria@trade.gov

# Germany Smart Cities Guide

## SMART CITY OVERVIEW

Germany provides global smart-technology solutions. In March 2012, the German government adopted the CO2-neutral, energy efficient and livable city of the future as the central theme of its High-Tech Strategy 2020. Europe's largest applied research organization, the Fraunhofer-Institute, has been put in charge of leading the Morgenstadt ("City of the Future") project, which aims to shape the complex future of sustainable cities. The CO2-neutral, energy efficient and climate-adapted city ("future city") is the central focus of Germany's action plan. Fraunhofer-Institute is establishing a network of global cities in order to establish global best practices while solidifying links between industry, cities, and applied science.

## KEY INITIATIVES (BY SECTOR)

### SMART MOBILITY

Germany's automotive industry focuses on drive train electrification (hybrid, battery and fuel cell vehicles) to reduce emissions, the dependence on oil, and to allow the vehicles of tomorrow to be fully integrated into a multimodal traffic system. Germany wants to become the lead market and provider of electric mobility by 2020 as part of its long-term, zero emission mobility vision. One of its goals is one million electric vehicles on the road by 2020 – a bold aim of Germany's "National Electro Mobility Development Plan." The German federal government has invested 1.5 billion EUR in electric mobility development. Seventeen electric vehicle models launched by German automotive manufacturers were available by 2014.

### SMART ENERGY

The German federal government's "Energy Concept for an Environmentally Sound, Reliable and Affordable Energy Supply" is a long-term energy strategy through 2050. It intends to make Germany one of the most energy-efficient and green economies in the world. Germany is at the forefront in international smart grid development (E-Energy) which allows fluctuating renewable energy power generation and consumption to be optimally managed. Germany decided to achieve 25% electricity production from combined heat and power (CHP) sources by 2020. The German gas industry has already made a commitment to replace 10% of commercial gas volume with renewable gas (hydrogen, methane rom wind electrolysis) by 2030. Energy storage technology developments are actively supported by initiatives and partnerships.

SMART TECHNOLOGY: Germany has the largest ICT industry in Europe and the fourth largest globally. The country's ICT sector plays a significant role in new technological developments - more than 80% of innovations in key industry sectors rely on smart technologies. The "Digital Germany 2015" ICT strategy, developed by the Federal Ministry of Economic Affairs and Energy, forms the framework for the country's ICT policy. One of the ICT industries' key strategic objectives is the development of intelligent networks in the energy, traffic, health, education and administration sectors based on a well- developed broadband infrastructure.

### SMART HEALTH

The percentage of the population in the ages over 65 will increase in the decades ahead. Thus, as part of the Health Research Framework Program of the federal government, Germany is supporting the development of diagnostic and therapeutic agents in the form of direct funding at different stages in the innovation process (from fundamental life science R&D to pre-clinical and clinical patient-based research and commercialization).

## CHALLENGES

See European Union section.

## FEATURED CITIES AND/OR PROJECTS

**Berlin:**

In April 2015, the Berlin Senate decided on the Smart City Berlin Strategy. The objectives include expanding the international competitiveness of the Berlin- Brandenburg metropolitan region, in- creasing the resource efficiency and cli- mate neutrality of Berlin by 2050, and creating a pilot market for innovative applications.

**Cologne:**

Cologne has recently implemented a smart traffic pilot with the help of IBM. Intelligent traffic management based on precise forecasting techniques, with remarkable accuracy, are sure to optimize traffic flow and expand the city's transportation network capacities.

**Hamburg:**

Hamburg, the first true "Seatropolis", is quickly emerging as one of the world's largest smart city showcases. It already has a number of pilot projects on the table. Among them: a virtual citizen services solution, where city administrative services are provided through a high-definition, remote video kiosk. Cisco, a Council Global Partner, just signed an agreement to help move Hamburg further down this path. What may set Hamburg apart, however, is its commitment to include its port– the city's economic backbone—in the smart equation.

**Mannheim:**

As a successful smart city, this German city is currently making a new mark and sharpening its profile, such as through the project "Model City of Mannheim." It is not by chance that this multicultural and innovative city in southern Germany received a New Economy Smart City Award in 2014 and was featured in the magazine's list of the 20 top smart cites. Mannheim is active in all areas of urban sustainability and is consistently bringing relevant processes into the economic, ecological and social activity of a smart city – and at a fast pace.

**Frankfurt:**

Frankfurt is the financial and transportation center of Germany, and the largest financial center in continental Europe. In several sectors, the city of Frankfurt is making a long-lasting commitment to sustainable technological innovation, and a reduction of carbon dioxide emissions. The House of Logistics is currently conducting research on traffic around the larger Frankfurt airport area, focused on heavy-load transportation vehicles. The city's modern traffic control center was put into operation in 2011, and now effectively monitors the flow of traffic in Frankfurt.

## UPCOMING EVENTS CALENDAR

- November 7-8, 2016: VDE-Kongress 2016 – Mannheim; www.conference.vde.com/vdekongress/Seiten/default.aspx
- April 24 - 28, 2017: Hannover Messe 2017 – Hannover; www.hannovermesse.de/en

## LINKS

- Bundesverband Smart City e.V. (Federal Associationa Smart City) www.bundesverband-smart-city.de
- Germany Trade & Invest www.gtai.de/GTAI/Navigation/EN/Invest/Industries/smarter-business.html
- German Partnership for Sustainable Mobility www.german-sustainable-mobility.de

## RESOURCES

Commercial Service: Bettina Capurro – Bettina.Capurro@trade.gov

# Greece Smart Cities Guide

## SMART CITY OVERVIEW

Greece remains far behind the EU average with no direct alignment between its smart city initiatives and Europe2020. Greece faces a key challenge in online public services, placing it among the last in the EU, which indicates that the level of sophistication of its services needs to improve significantly. Many "Smart" city initiatives have been taken independently by a handful of cities and municipalities without centralized infrastructure support. With only few exceptions, these initiatives are limited to fragmented "smart city" projects, lacking an overall smart city concept.

Although broadband connectivity has improved compared to 2015, Greece still ranks 26th among EU countries. Despite the fact that 99% of Greek households have access to fixed broadband, 34% of them do not yet subscribe. Moreover, Next Generation Access capable of providing high-speed Internet (at least 30 Mbps download) is available to only 36% of homes, far below the EU average of 71%. In order to fully develop its digital economy and society, Greece needs to expand Internet usage. Greece has one of the lowest levels of regular Internet users in the EU (63%), and 30% of the Greek population has never used the Internet (the EU average is 16.4%). This means that about one-third of the population cannot take advantage of Internet offerings, nor can they engage in a wide range of on-line activities.

## KEY INITIATIVES (BY SECTOR)

### SMART TECHNOLOGY INFRASTRUCTURE

Greece has a high %age of users that have access to 10 Mbps connectivity and a good %age of users that have access to 24 Mbps connectivity, so the target for 100% coverage of more than 30 Mbps until 2020 seams feasible. Within the next two years, the Greek government plans to stimulate digital infrastructure development, bringing high speed Internet to 200,000 new households. This aim is to deploy the fast- and super-fast broadband technologies in the country, supported by EU funds. The first phase started in 2014 with the rural broadband project, which is already in the implementation phase. In the next two years, the government will dedicate a budget of up to €425 million to the extension of rural broadband and the introduction of Superfast Broadband in urban areas.

### SMART HEALTH CARE

Provision of health services to elderly, disabled and chronically ill citizens based on the broadband network and portable devices, via which these citizens are steadily monitored, and by which they are offered health care services whenever necessary.

### SMART CITIZENS' SERVICE SYSTEM

Create platforms whereby citizens can place complaints about various aspects of everyday life (e.g. litter collection, pavement problems, parking spaces), which are properly addressed to municipal services for further handling.

### SMART PARK SYSTEM

Citizens can, by SMS, pay for municipality parking places, extend the duration of parking, and pre-reserve a parking place in the city.

### SMART TRANSPORT

The country plans development of a system that aims to offer reliable and effective public transport services in the city. By which, the municipality can monitor and manage the municipality fleet, monitor the public transport fleet, and monitor congestion in the city. It also offers e-ticketing services and location-based information on bus transportation.

### GIS – LOCATION-BASED INFORMATION TO CITIZENS

The country plans to increase use of IoT for providing information on a range of the city's services, such as medical services, entertainment, etc.

### TOURIST PORTAL

Provide tourist information on the region's assets, and the downloading of this information by PDAs, connected to free municipal Wi-Fi.

### E-PARTICIPATION AND E-DEMOCRACY

The highest priority issue is public participation in the decision-making process. The municipality has strongly promoted e-interaction with citizens and local businesses, who can not only help set the agenda of the municipal council (local priorities), but also express their opinions on the issues discussed by the council, then e-vote and finally e-interact with the city council to affect the final outcome. In such a context, e-Democracy and e-Participation are enhanced, as is the effectiveness of the various policies, as they relate to a well-informed and strongly-engaged public.

## CHALLENGES

See European Union section.

## FEATURED CITIES AND/OR PROJECTS

Two Greek cities set the technological example in local government. Trikala (e-trikala.gr) initially, and Heraklion (heraklion.gr) have gained recognition for their efforts:

**Trikala:**

Trikala is the first 'smart' city in Greece, awarded by the Intelligent Community Forum (ICF) for three consecutive years (2009, 2010 and 2011) for being among the top 21 'smart' cities of the world.

The main objective of the projects being implemented is to establish effective interactions among citizens, businesses and the local government (G2C, G2B and B2C interactions), serving sustainable urban development objectives. Towards this end, efforts have been concentrated on the following 'smart' dimensions:

a) smart living, aimed at improving the quality of life in the city;

b) smart economy, in support of business interaction and development;

c) safety of citizens, aimed at the protection of disabled citizens;

d) social care, aimed at the provision of e-Health services to the local population (in-house and mobile services);

e) e-Participation and e-Democracy, encouraging the active participation of citizens in the community's decision-making processes.

Furthermore, the city of Trikala was the site of the third large-scale demonstration for the CityMobil2 project. The CityMobil2 project involves several cities, which have investigated where and how automated road transport systems (ARTS) could most effectively be implemented. Between September 2015 and January 2016, a fleet of six Robosoft vehicles drove along a 2.5 km stretch integrated in the main city road network, including different traffic modes. Because of this initiative, Greece was the first EU country to apply an early stage National Law for automated transportation. http://trikalacity.gr/

**Heraklion:**

Heraklion was the only European city included in ICF's top smart city rankings in 2013. Six priority projects are being implemented focusing on:

a) energy and environment, including smart buildings, smart resources management and viable urban planning;

b) mobility, including efficient transportation, multimodal access and technological infrastructure;

c) e-governance, including online services, smart infrastructure, open and smart e-governance;

d) economy, including entrepreneurship and innovation, productivity and local and global connection;

e) citizens, including digital social inclusion and participation, education and creativity; and

f) living , including culture, safety and health.
www.heraklion.gr/en

## UPCOMING EVENTS CALENDAR

No upcoming events.

## RESOURCES

Commercial Service: Bryan Larson:
bryan.larson@trade.gov

# Guatemala Smart Cities Guide

## BASIC DATA ON THE ECONOMY

GDP per capita (PPP; 2015): $7,700

Major urban areas: Guatemala City - 2.918 million

Population (July 2015): 14,918,999

Industries: sugar, textiles and clothing, furniture, chemicals

## SMART CITY OVERVIEW

As the one of the most populous and densely inhabited country in Central America, and home to the largest urban area in the region, Guatemala plays a key role in the development of smart cities in the region. Investment on smart city infrastructure primarily focuses on three cities: Guatemala City, Resume, and Villa Nueva. In 2015, 51.6% of the country's population lived in an urban setting, with a 3.4% annual rate of change. In 2014, only 17.1% of the population had access to the Internet.

## KEY INITIATIVES (BY SECTOR)

### SMART ENERGY

**Proyecto Eficiencia Energética Municipal Guatemala:** In 2012, Guatemala City won the innovative initiative award during the World Smart Cities Awards for a public-private financed project using solar panels to provide lighting to low income communities. The program will provide low-cost clean energy in the form 1,400 solar panels distributed to 400 families and 1,000 street lamps throughout Guatemala City. In 2013, Spanish investors contributed 20 million Euros to the creation of what would become the largest solar farm in Latin America, generating 50 megawatts of electricity.

### SMART TRANSPORTATION

**Bus Rapid Transit (BRT):** In 2012, Guatemala City created and implemented a more secure bus system, in which bus drivers do not directly handle cash. This project aimed to cut down on extortion attempts targeting Guatemala City's bus drivers. Prior to this implementation, organized crime groups had collected $1.5 million in extortion fees from Guatemalan bus companies. With the new Bus Rapid Transit system, passengers either insert a coin into a fare machine or pay for the bus with a prepaid card.

### SMART HEALTHCARE

**Mobile System for Monitoring Acute Malnutrition in the Community:** Collaboration between the Ministry of Health of Guatemala, the United Nations Development Program, the TIGO Foundation, and the United Nations Fund for Children, text messages are used to monitor the nutritional status of Children. The program operates in 22 departments within Guatemala.

## FEATURED CITIES AND/OR PROJECTS

**Guatemala City:**

- As the largest urban center in Central America, Guatemala City can be seen as a leader in smart city infrastructure and innovation within the region.

- The Bus Rapid Transit (BRT) system is expected to expand, providing greater access to sustainable transportation for low income communities and cutting down on the profits of organized crime groups.
- Guatemala City's award winning solar infrastructure project aims to reduce the cost of electricity by 20% and establish the largest solar farm in Latin America.
- The business incubator Campus Tec seeks to take advantage of Guatemala's entrepreneurial and innovative potential to establish a global hub of technological innovation within Guatemala.

# Honduras Smart Cities Guide

## BASIC DATA ON THE ECONOMY

GDP per capita (PPP; 2015): $4,900

Major urban areas (2015): Tegucigalpa – 1.123 million, San Pedro Sula - 852,000

Population (July 2015): 8,746,673

Industries: sugar, coffee, woven and knit apparel, wood products, cigars

## SMART CITY OVERVIEW

While Honduras is a developing country, the country has begun to experience the impact of Smart Cities. Developments like the Altia Smart City showcase the country's potential for growth in the field of Smart City development. Events in San Pedro Sula like the Smart Cities Hackathon and Startup Weekend Mega bring regional entrepreneurs together to tackle the country's pressing issues.

## KEY INITIATIVES (BY SECTOR)

### SMART INVESTMENT

**Altia Smart City:** The Altia Smart City seeks to create a business friendly environment, attracting investment to the region by providing first class infrastructure. The project sits at a strategic location, in close proximity to downtown San Pedro Sula and only 20 miles from the nearest major port. As a designated Free Zone facility, the project offers tax and customs benefits. Altia Smart City consists of several primary components. The project includes a business park, a recreational center, a medical center, and a campus of UNITEC, Honduras's most prestigious university.

### SMART INFRASTRUCTURE

**Master Plan of Urban Development for the next 25 years for the City of San Pedro Sula:** The Municipality of San Pedro Sula, Honduras' commercial center and industrial capital, recently launched an international public bid process for the elaboration of an Urban Development Master Plan. The $ 3.6 million project and sustainable planning tool is aimed at transforming SPS into a "Smart City," targeting modernization, development and growth in areas such as transportation, social housing, and commercial construction. Through this government tender, the city of San Pedro Sula is seeking U.S. and other international consulting companies with ample experience in the development of City Master Plans. Additional information on this international public bid process is available through the following email: mailto: licitaciones.msps@sanpedrosula.hn

## FEATURED CITIES AND/OR PROJECTS

**San Pedro Sula:**

- In February 2015, the Smart Cities Hackathon was hosted as part of the Global Urban Data Fest in San Pedro Sula. The event was aimed at using technology based solutions to create intelligent cities.
- The UR Bus project uses a GPS to track public transit networks in the city and the Social Keys project allows passengers to use a mobile phone to pay for bus fares.
- In August of 2015, San Pedro Sula hosted Startup Weekend Mega, bringing in over 300 entrepreneurs from across Central America and Mexico.

# Hungary Smart Cities Guide

## SMART CITY OVERVIEW

Hungary has seen quite a handful of Smart City initiatives and test projects over the past years, both on a municipal and national level. However the country has yet to embark on a large scale and centralized smart cities undertaking as seen in many other Western European countries. Until now, many smart city initiatives were incentivized by collaborations of municipal and business players in this sector, often focusing on specific technical advancement. In order to enforce a more centralized management in this area, the government assigned the Lecher Center in 2015 to coordinate and support upcoming smart city initiatives and to link public and private players. This has ignited a movement for more smart cities projects in Hungary.

## KEY INITIATIVES (BY SECTOR)

### SMART MOBILITY

- Budapest's first public Smart Service Point (SSP) is an electric car charger, which also offers free WI-FI, modern LED illumination and incorporates security cameras and an emergency button for an intelligent, and energy-efficient urban life.
- BuBi – bicycle sharing network in Budapest consisting of 98 docking stations and 1,150 bicycles
- Rigo – the new electronic ticketing for the public transportation system creates a modern paperless payment infrastructure and features daily fare capping and the calculation of the cheapest possible tariff
- BKK Futar – mobile app helps navigate Budapest's public transportation system in absolute real time, displaying stations and preferred lines, routes and schedule.
- Test pilot of 20 new electric buses to be used in Budapest

### SMART GOVERNANCE

**National Info-communication Strategy 2014-2020:** Special focus on *digital Infrastructure* – i.e., Internet access to mobile broadband coverage, *digital competences* by reducing digital illiteracy, increased Internet usage and utilization of the *digital economy* with the development of electronic (commercial, bank, etc.) services and R&D and innovation activities.

**New Hungarian ID card**: a one-stop biometric card combines personal identification, social security and tax identification information, with an electronic signature.

**Government Window/Client Gate:** 240 service points and 613 partial or full services are online, for example, tax declaration, admin of personal documents, simplified notification of employment, application to higher education, certificate of criminal record check and judiciary e-portal , VAT & customs declaration, company registration (via an attorney-at-law), and e-Procurement.

### SMART HEALTHCARE

E-Health - test pilot launching this year including remote health services and uploading of patient data which then allows for e-consultations, the issuance of e-prescriptions, and the storage and processing of health data.

## CHALLENGES

Due to the decentralized nature of previous smart city initiatives, most opportunities were restricted to players who were already actively pursuing business in this field and have managed to capture a deal with a local municipality. Other initiatives were simply grass-root projects kindled by a certain public domain. The lack of a centralized

structure, transparency and support hinders market access and participation in new projects. With the new elected Lechner Center as the official smart city coordinator it is hoped that it will improve access to future projects even for companies from the U.S. Otherwise there are no specific trade barriers known to date that would be contrary to the laws set by the EU.

## FEATURED CITIES AND/OR PROJECTS

**Győr:**

- Installation of 150 smart street lights and related smart network management in addition to new electric car charging stations;
- Installation of solar panels on public buildings such as a primary school, a healthcare institution and a cultural center and extending the use of alternate energy resources such as biomass, wind and geothermal energy;
- Development of an energy management system at the Aqua Sport Center for significant energy savings during operation of the facility;
- City Service App: citizens can submit service requests or address issues in the city all with the assistance of GPS coordinates.

**Miskolc:**

- Adherent of the REgeneration MOdel for accelerating smart URBAN transformation;
- Energy: Intelligent street lightning in selected districts, solar roof/cadaster, energy yards for supplying trams, interventions on residential buildings (EE+RES), increased energy efficiency in public buildings, smarter tram stops;
- Mobility: including vehicles such as municipal e-fleet, pedelec-fleet, e-bus for tourists, CNG fueled taxis & charging points and smart bike storage, while incorporating intelligent traffic lights and smart speed limiter systems, dynamic route planner and parking place allocation & management;
- ICT: Pilot on smart service points, data managements & intelligent adaptive control; pilot & widespread smart metering solutions in buildings to be monitored in an integrated manner; development of e-fleet management tools and smart-grid systems; and APP! for narrow gauge railway real-time schedules.

**Szolnok:**

- CityGuard includes services such as the safe clubbing initiative, street surveillance and the "Where is my car?" fleet tracking;
- CityPass card: community pass for use of public transportation and parking, student ID, electronic signature and supports e-gov activties, social benefits, loyalty rewards etc.;
- Smart metering of homes together with a payment system;
- Sustainability through public lighting optimization and optimal energy management.

## UPCOMING EVENTS CALENDAR

November 9th-10th, 2016: Urbania21 – Budapest; http://www.urbania21.hu/

## LINKS

- Lechner Központ. Link: http://lechnerkozpont.hu/cikk/okos-szabalyozasok-okos-varosok
- Design Terminal. Link: http://smartcitylab.designterminal.hu/ & http://citylab.designterminal.hu/
- Smart City Budapest Initiative – Mindspace Nonprofit Ltd. Link: http://smartcitybudapest.eu/hu
- T-City Szolnok – T-Systems Hungary Ltd. Link: https://www.t-systems.hu/smartcity/

- IBM – MTA: Smart Cities study / solutions.
  Link: http://www.ibm.com/smarterplanet/hu/hu/smarter_cities/overview/
- Sagemcom Magyarorszag Kft.
  Link: http://www.sagem.hu/hu/rendszerintegracio/okos-varos-smart-city

## RESOURCES

Commercial Service: Bianka Wallner:
bianka.wallner@trade.gov

# India Smart Cities Guide

## SMART CITY OVERVIEW

The Government of India (GoI) has prioritized infrastructure development as a key policy goal due to its potential to boost economic growth and expand the provision of essential public services. According to Government of India, the country will need to invest between $1.2 and $2 trillion dollars on infrastructure development over the next several decades. A large portion of this investment will be required to accommodate India's growing urban population, which is estimated to reach 590 million by 2030.[76] Expanding and improving the supply of basic services such as power, water, and sewerage will be a major focus of upcoming project opportunities.

In June 2015, Prime Minister Modi announced the launch of the Smart Cities Challenge, an initiative that encourages Indian cities to compete for central government funds for smart city development. In addition to supporting the provision of core infrastructure and services, the Smart Cities Challenge promotes projects that foster sustainable and inclusive development, a clean environment, and the application of "Smart" solutions. In January 2016, The Ministry of Urban Development selected the first 20 cities that will each receive $75 million over a period of five years to implement smart city development plans.[77]

The GoI has been exploring ways to expand private sector involvement in infrastructure projects. Recently, the GoI constituted a panel to review India's Private Public Partnership policy and implement a better risk-sharing mechanism between private developers and the government after analyzing the existing PPP framework and projects in various sectors. This year, the committee came out with recommendation proposing design changes to contractual arrangements under the PPP framework in line with international best practices and measures to improve capacity-building within the government for implementation of PPP projects.

## KEY GOVERNMENT OF INDIA INITIATIVES

The projects envisioned under the governments' infrastructure initiatives and the Smart City Challenge provide opportunities in a wide range of sectors including water and power supply, sanitation, public transport, affordable housing, IT connectivity, e-governance, safety and security, health, education, and the environment.

### SMART ENERGY

With over 300 million people still lacking access to power in India, the GoI is eager to expand power generation capacity and connectivity to ensure 24/7 electricity access. In 2015, the GoI announced the goal of deploying 175 GW of renewable energy by 2022 in order to expand electricity access while also increasing the mix of clean energy in the grid. The government plans to meet 100 GW of this target through solar energy.

### SMART WATER AND SANITATION

Through the Atal Mission for Rejuvenation and Urban Transformation (AMRUT), the GoI is focused on improving India's urban sewerage and water infrastructure. The main goal of AMRUT is to achieve universal access to tap water and sewerage facilities, promote the use of public transport, and develop green urban spaces. AMRUT is administered by the Ministry of Urban Development and covers 500 Indian cities, some of which are also competing in the government's Smart Cities Challenge.

[76] India's Urban Awakening: Building Inclusive Cities, Sustaining Economic Growth. McKinsey Global Institute. April 2010. http://www.mckinsey.com/global-themes/urbanization/urban-awakening-in-india

[77] Smart Cities Mission Statement & Guidelines. Ministry of Urban Development. June 2015. http://smartcities.gov.in/writereaddata/SmartCityGuidelines.pdf

### SMART HOUSING

In 2015, the GoI launched the Housing for All by 2022 initiative. Through this program, the Government of India plans to invest $30 billion within 300 cities and towns over the next 6 years. Projects will focus on slum rehabilitation, increasing access to affordable housing through credit-linked subsidies, and fostering house construction and enhancement.

### SMART ITC

The Indian government launched the Digital India initiative in July 2015 with the aim of improving Internet connectivity and e-governance. The major components of the Digital India initiative include enhancing digital infrastructure by connecting Indian villages to broadband and high speed Internet, establishing digital identities, and ensuring the safety and security of cyberspace.

### SMART WASTE MANAGEMENT

Swachh Bharat Abhiyan, or Clean India Mission, is managed by the Ministry of Urban Development and provides funds to improve municipal solid waste management.

## KEY U.S. GOVERNMENT INITIATIVES

U.S. Government engagement on smart cities in India is led by the Department of Commerce and includes multi-agency efforts across various sectors. Major initiatives include:

### SMART CITIES INTEGRATED PLANNING TECHNICAL ADVISORY SERVICES:

The U.S. Trade and Development Agency (USTDA) has contracted with a technical advisory team to support integrated smart cities planning and infrastructure development in India. The technical advisory team is assessing existing smart city planning strategies and modernization plans and will recommend technical projects and provide expert counsel to USTDA's potential partners in India and the United States on smart cities development. USTDA recently concluded hosting two workshops in Ajmer and Allahabad focused on capacity building and is now working to prepare these cities for the second round of India's Smart City Challenge.

### COMMERCE-LED SMART CITIES INFRASTRUCTURE TRADE MISSION:

One of the deliverables from President Obama's Republic Day visit in January 2015 and the 2015 U.S.-India Strategic and Commercial Dialogue (S&CD) was a Smart Cities Infrastructure Trade Mission to India, led by the U.S. Deputy Secretary of Commerce Bruce Andrews. The mission took place from February 8-12, 2016 and included 40 executives from 18 U.S. companies. The trade mission visited the cities of New Delhi, Mumbai, Chennai, and Vishakhapatnam (Vizag). Represented industry sectors included water/wastewater, ICT, smart grids, and project management/construction.

### SMART CITY MASTER PLANNING AND SECTOR-SPECIFIC SMART CITY PROJECT PLANS FOR VISAKHAPATNAM:

USTDA signed a master planning grant agreement with the Municipal Administration and Urban Development Department, State Government of Andhra Pradesh, to provide smart city master planning services for Visakhapatnam (Vizag). In response to the Government of India's interest in enhancing public service delivery and promoting economic development, the Technical Assistance will provide a planning framework, development strategy and a set of high-priority investment projects for smarter urban development. AECOM Technical Services, Inc. (AECOM) will conduct the Technical Assistance, with the support of two U.S. subcontractors, KPMG LLP and International Business Machines Corporation (IBM).

### U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT (USAID) PARTNERSHIPS FOR SMART CITIES:

USAID has partnered with the Government of India to promote disaster preparedness, response, and resilience at the municipal and city level. They are working to develop Hazard Risk and Vulnerability Assessments, train municipal administrators in disaster management, and strengthen early warning systems to enhance disaster preparedness. USAID is also working

under a Memorandum of Understanding (MOU) with the Ministry of Urban Development to support the Swachh Bharat Mission.

### ANDHRA PRADESH SMART SOLUTIONS FOR SMART CITIES REVERSE TRADE MISSION (RTM):

From February 22-26, 2016, USTDA and the Commercial Service-India hosted and co-led a Reverse Trade Mission (RTM) for officials from the State Government of Andhra Pradesh and the major port city of Vishakhapatnam (Vizag) to visit the United States. The purpose of the RTM was to showcase U.S. best practices and technologies that enable cities to be integrated, efficient and safe. The visit included meetings with U.S. federal, state, and city organizations that have adopted and deployed smart city best practices. A total of fourteen delegates from Vizag, Andhra Pradesh, and the Ministry of Urban Development participated in the RTM.

The following U.S. Government programs are also planned:

### EDUCATIONAL LINKAGES AND SMART CITIES OUTREACH THROUGH THE INSTITUTE OF SUSTAINABLE CITIES (ISC):

- ISC will be sending two Energy Conservation experts and two Transportation/Urban Planning experts to Ajmer, Allahabad, and Vizag to assist in smart city project planning.
- The North India Office of the U.S. Embassy will continue to follow up with local officials and educational institutions to discover opportunities for the Mission and report on the progress of the Smart Cities program.

### ARMY CORPS OF ENGINEERS: UTTAR PRADESH FLOOD RISK MANAGEMENT:

- The Army Corps of Engineers (USACE) plans to discuss flood risk management with officials in Allahabad. They will be sending out a team of water management engineers to scope the water works of Allahabad and build capacity by providing expertise relating specifically to Allahabad's current water systems.

### US AGENCY FOR INTERNATIONAL DEVELOPMENT:

- Ongoing engagements in Vizag for Water, Sanitation and Hygiene (WASH) projects and Disaster Planning.
- Planned launch of a Maternal and Child Health Innovation Challenge which will award approximately US$500,000 in total to support stage 1 innovations in each of the three cities.
- Planning a Smart Grid event in Ajmer this summer with the USAID Mission Director.

### US TRADE AND DEVELOPMENT AGENCY:

- Planned workshops in May in Delhi and Mumbai which will explore ways to leverage the Government of India's AMRUT program.
- Reverse Trade Mission for Ajmer and Allahabad (combined delegation) co-led by USTDA and the Foreign Commercial Service will potentially take place in the late summer.

## CHALLENGES

The major challenge facing company participation in Indian smart city projects is a lack of large-scale infrastructure financing. For instance, municipal bonds are generally not an option for raising project financing due to the limited capacity of Indian cities to issue bonds and the lack of a strong municipal bond market in India. India also faces challenges in attracting private financing through Public-Private Partnerships due to poorly structured concession agreements, low bureaucratic capacity to implement complex infrastructure projects, and a weak legal and regulatory framework. The private sector investment has virtually ground to a halt. The cost of capital is high, and public sector banks are reluctant to extend credit because they have too many bad loans.

In addition, U.S. face strong competition from other countries that are able to offer more attractive financing terms for smart city projects. For example, Japan is able to secure large-scale infrastructure projects by offering below-market interest rates. This has generated considerable

positive press for high-profile projects such as the high-speed rail between Delhi and Mumbai.

## FEATURED CITIES AND/OR PROJECTS[78]

**Bhubaneswar, Odisha:**

Bhubaneswar topped the list of the 20 smart cities selected under the Smart Cities Challenge in February 2016. Projects include retrofitting and redeveloping 985 acres around the main railway station and creating an Intelligent City Operations and Management Center (ICOMC) to integrate urban services. The ICOMC project will be implemented on a 'Managed Service Contract' model to integrate various urban-management systems. The ICOMC will include traffic management, video surveillance, electronic parking, citywide automatic vehicle locater (AVL), bus fare card system, para-transit and Emergency response services. Most of the projects are proposed as Public-Private Partnership projects. The city also proposed to develop the Asian Development Innovative Municipal Financing Facility, City Level Infrastructure Development Fund and the Smart National Common Mobility Card project.

**Pune, Maharashtra:**

Projects include retrofitting 900 acres, establishing an innovation center, providing sanitation, and facilitating ICT-based solutions for improving mobility which also includes intelligent traffic signaling. The city also plans to overhaul its water supply system with new connections and pipelines, as well as implement smart bulk metering at eight water-treatment plants. The majority of these projects will be financed with public funding through the GoI's Smart City Mission and other central government programs, as well as through a land monetization scheme, improved tax collection, and corporate social responsibility funding. The U.S. Department of Treasury plans to provide assistance to the Pune municipality for developing and implementing a municipal bond financing project.

[78] Information on upcoming projects in the 20 selected Smart City Challenge cities obtained from Live Mint, http://www.livemint.com/Politics/eER1ilL9HJY6QF5k2skS3J/Smart-cities-the-first-20.html

**Jaipur, Rajasthan:**

Projects include retrofitting 600 acres within the walled city and improving solid waste management and mobility through ICT-based solutions. Sustainable civic infrastructure is also ranked high on priority project list which will include wastewater recycling and rainwater harvesting for public buildings. Jaipur Nagar Nigam will consider issuing pooled municipal finance bonds and will transfer part of the amount raised to the Special Purpose Vehicle (SPV) in charge of implementing these smart city projects.

**Surat, Gujarat:**

Projects include retrofitting 2,167 acres of the textile market area and improving transport connectivity. The city plans to develop a Smart City center as the administrative control center for delivery of all civic services. The Smart City Center will help all departments of the city in maintaining civic service delivery standards on a daily basis. The majority of the projects will be financed through the GoI's Smart City Mission and Public Private Partnerships. The Municipality is also considering issuing municipal bonds through improving its credit rating.

**Kochi, Kerala:**

Projects include retrofitting the urban area around Fort Kochi-Matancherry and Central Kochi, establishing high-speed water connectivity and an intelligent water management solution to provide 24x7 water supply, and providing integrated delivery of Government-to-Citizen services through smart card and mobile platforms. Kochi plans to raise approximately US$ 37 million through debt to meet funding requirements.

**Ahmedabad, Gujarat:**

Projects include retrofitting and redeveloping 590 acres and creating an integrated transit management platform with a common card payment system. The city also plans to have a command control center to integrate the city's various services. Also, water accounting at community level will be integrated with the command control center. The majority of project

financing will be provided through the GoI's Smart City Mission.

**Visakhapatnam, Andhra Pradesh:**

Vishakhapatnam (Vizag) is one of the three smart cities in which the U.S. government has been invited to work with the municipal and state authorities to design a smart city development plan and build capacity in project implementation. Projects include retrofitting 1,650 acres of beachfront area and creating an ICT-based disaster management system. The city plans to include components like GIS, asset management, property tax system and communication gateways. The smart city Special Purpose Vehicle will be a shell company consisting of 10 sub-components. Each sub-component will be responsible for a cluster of projects. SPVs are inclusive of 89 % shareholding by private sector partners.

**MUMBAI, India**

Population Growth, 2013-2014:
**1.2%**

Total Employment, 2014 (Thousands):
**8,535 People**

Real GDP Growth 2013-2014:
**6.3%**

Employment Growth, 2010-2014:
**1.9%**

*Brookings Metro*

**New Delhi:**

Projects include retrofitting 550 acres within the New Delhi City Center comprising Connaught Place and surrounding areas. The plans include using e-governance platform for citizen engagement, for delivering municipal services, smart detection for water leakages, smart metering and billing. The city has also prosed air quality monitoring project as a priority. These projects will be funded using municipal funds and central government funding through the GoI's Smart City Mission.

**Guwahati, Assam:**

Projects include retrofitting 696 acres, improving storm water drainage, traffic management, and advanced flood warning, and providing CCTV surveillance in public areas. In terms of improving storm water drainage, the city plans to repair its network of storm water channels and integrate abutting open spaces with channels to allow for water retention and rainwater harvesting. Guwahati also plans to develop a new hydrological information system to generate real-time data on flood forecasts. All the projects will be financed through the GoI's Smart City Mission.

**Chennai, Tamil Nadu:**

Projects include retrofitting 1,717 acres, adopting ICT-based solutions to improve public transport, and improving disaster management systems. The city aims to give all households smart bi-directional electrical net-meters, which will also be useful for conversion to rooftop solar systems in future. Chennai also plans to implement storm water management systems, intelligent traffic management and integrated public transport. The city is considering financing smart city projects through the GoI's Smart City Mission and PPPs.

## UPCOMING EVENTS

- **Efficient Buildings Summit 2016**
  Jul 22 2016 to Aug 11 2016 — Mumbai

  Efficient Buildings Summit 2016 is a definitive platform for you to connect with the who's who of the industry and plant the brand in the minds of key decision makers from both public & private sector converged under one roof.

- **11th Construction World Architect & Builder Awards 2016**
  Aug 11 2016 — Mumbai

  The Construction World Architect and Builder Awards were instituted by ASAPP Info Global Group in 2006. They are India's most coveted awards for the architecture and building industry.

- **Oct 19-21 Intersolar India 2016**
  Aug 19 2016 to Aug 21 2016 — Mumbai, India

  Intersolar India - India's largest exhibition and conference for the solar industry.

- **Sep 7-9 Renewable Energy India Expo 2016**
  Sep 7 2016 — Greater Noida, India

  The show aims to upscale and mainstream the applications of renewable energy resources, showcase innovations, and

enrich deliberations by providing the industry with an international exhibition and conference platform

- **Sep 28-30, IFAT India 2016**
  Sep 28 2016 to Sep 30 2016 — Mumbai, India

  The 4th Edition of IFAT India scheduled from September 28 – 30, 2016 at Hall 5, Bombay Exhibition Centre (BEC), Mumbai, India. he show will provide opportunities to the attendees to display their products and technologies in front of potential customers and to meet with key decision makers and partners.

# Indonesia Smart Cities Guide

## SMART CITY OVERVIEW

Bandung is the capital of West Java province, and is the third largest city in Indonesia. Bandung has grown rapidly over the past decades and is expected to continue to grow. Its number of inhabitants is expected to nearly double from 2.4 million now to 4 million in 2030. The standard of living, the availability of sufficient working and public space, the assurance of clean and sustainable air, access to water and energy, the management of waste and the availability of transportation will all become increasingly important. Citizens will also expect better services from Bandung city in terms of health, education, and financial stability through job opportunities.[79]

Thriving population growth in Bandung is concurrently creating urban challenges in the form of increased pollution, traffic congestion, waste management issues, and public housing shortages. The Mayor of Bandung, Ridwan Kamil, is an active supporter of Smart City solutions to address the challenges Bandung is facing. In 2015, the City of Bandung installed approximately 5,000 free Wi-Fi hotspots across the city, and plan to install up to 40,000 hotspots to provide more citizens with access to free connectivity.[80] The Bandung government announced at the end of 2015 that it will quadruple the budget for its 2016 Smart City program, from IDR25 billion (US$1.8 million) to IDR 100billion (US$7.3 million), which will be used to build up the city's digital infrastructure.[81]

Bandung is the first city to have a Smart City Council, consisting of 30 experts tasked with making a blueprint for Bandung over the next five years. Bandung is planning to introduce a smart card, which will allow users to ride public transport, pay for gas and complete transactions in a push to become a cashless society.[82]

## KEY INITIATIVES (BY SECTOR)

### SMART PUBLIC SAFETY

Launched in 2015, the Bandung Command Center monitors and manages city operations. The Command Center provides visibility on various aspects of the city, collecting and analyzing data from CCTV networks installed across the streets of Bandung.

Through video analytics, security personnel are automatically notified if irregular activities are captured on the city's CCTV systems. A GPS tracking system is used to assist municipal agencies to monitor traffic, or track assets such as public buses, ambulances or fire trucks.[83]

To improve public safety, a security app known as Panic Button has been launched and made available to citizens, developed by local tech startup X-igent. In the event of an emergency, users can tap on the panic button and receive immediate assistance from the Bandung Command Centre. The app will also be able to contact a whitelist of emergency contacts created by the user.[84]

### SMART E-GOVERNMENT

To deliver public services more efficiently, the Bandung government is developing 1000 government-focused applications, set to launch in 2017. Bandung currently offers an online reporting

[79] Lidia Mayangsari and Takeshi Arai, "How Bandung Smart City Policy Influences Its Citizen's Quality of Life: I. Model Development", 2010-2014, 07 June 2016, <http://www.systemdynamics.org/conferences/2015/papers/P1209.pdf>

[80] Ibid.

[81] Tan Wee Kang, "Bandung's Smart City Initiatives," 15 December 2015, 07 June 2016 <http://www.enterpriseinnovation.net/article/bandungs-smart-city-initiatives-246675038>

[82] Oxford Business Group, "Ridwan Kamil, Mayor of Bandung: Interview", 07 June 2016, < http://www.oxfordbusinessgroup.com/interview/obg-talks-ridwan-kamil-mayor-bandung>

[83] Ibid.

[84] Ibid.

system for citizens to report municipal issues, the system also allows the municipal issue to be tracked to completion. Other programs include Bandung's online procurement system to help mitigate corruption, and a project management application to monitor and track the progress of civic projects.[85]

## SMART TECHNOLOGY

The Technopolis is a satellite city that will serve as Bandung's urban technology center. To attract foreign investment, the Technopolis will be designated as a special economic zone in which all permits will be handled independently within the complex, removing the need for companies to request a permit from the city proper. The Technopolis has thus far received interest from the United States, the United Arab Emirates, and Japan.[86]

## CHALLENGES

Challenges in moving forward with 'smart' solutions in Bandung include: (1) waste disposal issues and related high pollution levels; (2) the propensity of the City to flooding; (3) a complex traffic system; (4) a lack of road infrastructure; and (5) continued political momentum following Mayor Kamil's term.

## UPCOMING EVENTS

- November 1-3, 2016: Smart Cities Indonesia Expo 2016 – Serpong & Tangerang, Banten, Indonesia (near Jarkarta)
- July 16-24, 2017: Smart City Summit Indonesia: Hosted by Global Smart City & Community Coalition – Jakarta, Bandung, and Surabaya, Indonesia

[85] Ibid.

[86] Oxford Business Group, "Ridwan Kamil, Mayor of Bandung: Interview", 07 June 2016, < http://www.oxfordbusinessgroup.com/interview/obg-talks-ridwan-kamil-mayor-bandung>

# Ireland Smart Cities Guide

## SMART CITY OVERVIEW

Ireland boasts a highly developed economy where smart city initiatives and deployments are growing nationwide. The Irish Government has stated its ambition for Ireland to become a digital economy 'hot-spot' in Europe by 2025 through leading in the adoption and application of advanced ICT across the enterprise economy and the public sector. Ireland has a population density of about 67 persons per square km. Around 62% of the 4.6 million population live in cities or urban regions.

The four main cities – Dublin, Cork, Galway and Limerick – have each deployed smart city technologies with Dublin and Cork the most advanced in terms of rollout and strategic vision. To date, all smart city initiatives have been built on top of legacy infrastructure and many decades of social and economic programs, rather than creating new smart city districts. At the same time, green-field initiatives are emerging in Dublin and Cork with both cities creating strong vision-oriented smart city strategies: Smart Dublin (www.smartdublin.ie) and Cork Smart Gateway (www.corksmartgateway.ie). In both cases, the vision is a mix of data-driven, networked infrastructure, fostering economic growth and entrepreneurship, and citizen-centric initiatives. There is particular focus on creating more efficient city services, improved transportation flows, tackling flooding, attracting inward investment and encouraging indigenous start-ups and SMEs together with open data and civic engagement.

Ireland has a growing ecosystem of 'university-industry-local government' smart city research centers and collaborations. These include 'The Programmable City' (implications of creating smart cities), 'Innovation Value Institute' (business models for smart city technologies), 'Insight' (data analytics for smart cities), 'CONNECT' (networking and communications for smart cities), 'Future Cities' (sensor, communication and analytical technological solutions for sustainability), National Sustainable Building Energy Testbed and the Water Systems and Service Innovation Centre.

The strong $500 billion U.S-Ireland commercial relationship has ensured U.S. firms such as Intel, IBM and Cisco have been actively involved in Irish Smart City initiatives from an early stage. There is a strong openness to further collaboration with emerging U.S. innovators of smart city technologies, solutions and services. This may be amplified by the strong Sister City relationships between the United States and Ireland.

## KEY INITIATIVES (BY SECTOR)

### SMART TECHNOLOGY

The Irish are very tech-savvy and love their gadgets. Mobile penetration rate is 126% and about 70% of the population uses a smartphone device. Social media usage is very high among younger age groups. About 85% of households have Internet access with the majority having broadband subscriptions. There is growing use of digital technologies among older generations, with 45% of those over the age of 50 going online every day.

A €2.5 billion commercial investment in the roll-out of enhanced telecommunications services across Ireland has resulted in high-speed broadband services now available to around 1.2 million premises. By the end of 2016, 70% of premises (1.6 million properties) will have access to quality high-speed broadband. The Irish government has a €275 million National Broadband Plan that will rollout similar services to the remaining 30% of the country - areas where there is no certainty of commercial investment, but where families and businesses are equally entitled to high quality broadband access.

## SMART ENERGY

The Sustainable Energy Authority of Ireland (SEAI–www.seai.ie) is the Irish government's lead agency on the initiation and promotion of smart energy/grid projects. The Commission for Energy Regulation (www.cer.ie) is leading preparations for the rollout of smart metering in Irish households by 2019. Ireland's energy utility ESB (www.esb.ie) and transmission system operator EirGrid (www.eirgrid.com) are at the forefront on smart grid initiatives nationally. There are around 420,000 public streetlights operated by local government authorities who outsource maintenance through competitive tendering in line with EU public procurement rules.

## SMART BUILDINGS

The energy efficiency (EE) of buildings is a priority of the Irish Government with the SEAI (www.seai.ie) the lead agency. Buildings accounted for 35% of total final energy consumption and about 59% of electricity consumption in 2014. Ireland has a relatively unsophisticated commercial buildings stock (109,000 units) and a high incidence of buildings in which relatively basic upgrades could lead to significant energy savings. SEAI is currently undertaking detailed research on the commercial sector building stock as limited data exists regarding energy consumption. Publication of this new data by 2017 will highlight the future market opportunity for Smart Building technologies.

## SMART/ALTERNATIVE MOBILITY

Ireland is investing in this area, with many projects for electronic ticketing and parking, bus lanes, public transport apps, bike sharing and new bike lanes. The market for hybrid and electric vehicles is growing very slowly with only 562 new electric vehicles registered in 2015. ESB's eCars project has rolled out 1,200 public charge points across the island of Ireland.

## CHALLENGES

No specific challenges or market access barriers have been identified.

## FEATURED CITIES AND/OR PROJECTS

**Dublin:**

Ireland's capital city has developed a series of smart city initiatives over the past five years. There are a wide range of smart city-type apps available, some provided/commissioned by local government authorities (e.g., Art Trax, Heritage Walks, Mindmindr), others developed by citizens and commercial enterprises (e.g., Hit the Road, Parkya, Walk Dublin10). Locally, there are research centers such as 'Dublin Energy Lab' (smart grids and meters) and some industry centers (IBM's smart city global research team) and test-beds (especially relating to the Internet of Things). Smart Dublin (www.smartdublin.ie) is an initiative of the four Dublin local authorities to engage with smart technology providers, researchers and citizens to solve city challenges and improve city life. It aims to position Dublin as a world leader in the development of new urban solutions, using open data, and with the city region as a test bed.

**Cork:**

In Ireland's second city, a 'smart agenda' is being developed that builds on the existing assets, attributes and experiences in the region through the Cork Smart Gateway (www.corksmartgateway.ie) initiative, which is a collaboration between the two (city and county) local authorities, the Nimbus Research Centre (Internet of Things, networks) and the Tyndall National Institute (ICT, microelectronic circuits, nanotechnology, energy, photonics). This strategy aims to have government, industry, academia and civil participants work together to co-create and drive structural change utilizing ICT solutions. Cork is a 'follower' City in an EU Smart Cities and Communities Horizon 2020 project called GrowSmarter. A €25million initiative (lead cities: Stockholm, Cologne, and Barcelona), GrowSmarter establishes three 'lighthouses' for smart cities

which demonstrate to other cities how they can be prepared in an intelligent way for the energy challenges of the future. As part of this project, Cork will roll out initiatives in transport, energy, and information and communications technology. Irish, European and U.S. firms are also driving Internet of Things development in the region, for example, EMC and Vodafone have jointly invested -2million in a new INFINITE IoT industrial platform that will traverse Cork.

## UPCOMING EVENTS CALENDAR

- November 15-17: Smart Cities World Expo 2016 – Barcelona, Spain; http://www.smartcityexpo.com

## LINKS

- Intelligent Transport Systems Ireland – http://www.itsireland.ie/
- Future Cities Research Centre – https://www.tcd.ie/futurecities/
- Insight Centre for Data Analytics – https://www.insight-centre.org/
- Nimbus Centre – http://nimbus.cit.ie/
- Programmable City – http://www.maynoothuniversity.ie/progcity/
- Tyndall National Institute – https://www.tyndall.ie/

## RESOURCES

Commercial Service: Padraig O'Connor – padraig.o'connor@trade.gov

# Italy Smart Cities Guide

## SMART CITY OVERVIEW

Italy has over 1,300 significant Smart City initiatives impacting over 15 million citizens with investments exceeding $5 billion. This puts it amongst the top EU countries for Smart City projects. $110 million has recently been made available by the Italian government to small Italian cities to develop infrastructure projects, including energy efficiency applications in public buildings and new plants producing renewable energy. In addition, $385 million in loans will soon become available at a subsidized rate for energy efficiency projects in public schools.

Italy wants to be a leader in Smart City technology, and through ENEA (the Italian National Agency for New Technologies, Energy and Sustainable Economic Development) has cooperated with the US. Department of Commerce's National Institute of Standards and Technology (NIST) to launch an international technical working group to develop a white paper defining common architectural principles and a vocabulary for Smart City technologies. Other international partners supporting the initiative are: ANSI, the American National Standards Institute; ETSI, the European Telecommunications Standards Institute; MSIP, the Republic of Korea's Ministry of Science, ICT and Future Planning; USGBC, the U.S. Green Building Council; and FIWARE, an open cloud-based platform for cost-effective creation and delivery of innovative applications and services.

## KEY INITIATIVES (BY SECTOR)

### SMART TECHNOLOGY

Italy's Smart City applications have highlighted the need for enhanced broadband and ultra-broadband availability. Interoperability, standardization, replicability and regulatory frameworks are major issues to be faced. The Italian government has approved a plan to allocate 8 billion $ in the next five years towards building ultra-high-speed broadband fiber optic NGA (Next Generation Access) networks that will have a strategic and driving effect for the national economy. Investments of 2.6 billion $ are also expected from the private sector. ENEL - Italy's largest power company and the second largest "Smart Technology" utility in Europe - is discussing with telecom operators and government agencies the possibility of using its pipe infrastructure over the next four years to conveniently bring fiber optic telecom cables to 34 million households when ENEL replaces its energy smart meters.

### SMART ENERGY

Outdoor Smart Lighting is one of the most commonly deployed applications in Italy, with close to 500,000 street lights connected. The upcoming installation by ENEL of 34 million new smart meters with real-time access to energy consumption data and statistics will allow smart energy management in 90% of Italian households.

### SMART BUILDINGS

The energy efficiency (EE) of buildings is a priority of the Italian Government. At least 4.5 million buildings in Italy are in need of EE renovation. Demand is constantly increasing for automation technologies that contribute to the energy efficiency of homes and large buildings including integrated climate and lighting management.

### SMART/ALTERNATIVE MOBILITY

Italian cities are increasingly investing in this area, with many projects for car sharing, carpooling, electronic ticketing and parking, public transport apps, congestion-charge zones, scooter sharing, bike sharing and new bike lanes. There are 500,000 car sharing users in 12 Italian cities. The market for hybrid and electric vehicles is constantly growing, especially for car sharing and taxi fleets. ENEL is planning to install up to 15,000 charging units throughout the country in the next two years.

## CHALLENGES

No specific challenges or market access barriers have been identified.

## FEATURED CITIES AND/OR PROJECTS

**Milan:**

Milan is recognized as the #1 Smart City in Italy, with 350,000 car sharing, 40,000 bike sharing and 36,000 scooter sharing users. The city also has 400+ free Wi-Fi hotspots and 700 access points. The city is pursuing many additional smart city initiatives, including an integrated project to monitor and control water, waste and energy consumption.

**Turin:**

Turin has implemented over 60 smart city projects, including its 5T technological system - a highly evolved system for traffic light control and for public transport routes using geolocation. The transformation process is now expanding throughout the Turin metro area, with the objective to develop 100 new smart city projects.

**Bologna:**

Bologna is particularly known for its smart city services related to governance, education, culture and sustainable mobility. Its new, user-centered "Iperbole Civic Network" (http://www.comune.bologna.it/english) offers integrated access to all public services and to innovative smart collaboration and participation platforms.

**Florence:**

Florence has developed a highly regarded open data platform with more than 500 datasets for ICT-enabled citizen participation. Florence will also participate in the REPLICATE EU funded project, together with Spain's San Sebastian and Britain's Bristol. The project will develop integrated solutions for sustainable mobility, energy saving and smart facilities, e.g. video-surveillance systems, public LED illumination and Wi-Fi connections. The project will involve 30 Italian public and private partners.

## UPCOMING CALENDAR EVENTS

- October 19-21, 2016: Smart City Exhibition 2016 – Bologna; http://www.smartcityexhibition.it/?lang=en
- March 8 - 11, 2017: MADE Expo – Milan; http://www.madeexpo.it/en/made-expo-2017.php

## LINKS

- ANCI/Forum PA—Smart City Working Group: www.italiansmartcity.it
- Telematics Association for Transport and Safety: www.ttsitalia.it/?lang_pref=en

## RESOURCES

Commercial Service: Robert Peaslee – robert.peaslee@trade.gov

# Japan Smart Cities Guide

## SMART CITY OVERVIEW

Prior to Japan's natural and nuclear disasters of March 2011, Japanese policymakers viewed smart grid technologies as potential export opportunities, and focused on their development from that perspective. Following the March 2011 disasters and the shutdown of Japan's nuclear fleet, policymakers needed to find a new approach to ensure efficient power generation, distribution, and use, noting the need to improve energy conservation and energy resilience. As part of a solution, Japan introduced several policies and set up numerous projects to support the development of smart cities.

One need was to improve Japan's system of energy distribution. Electricity market reform was approved in April 2013 with the goal of creating a stable and inexpensive electricity supply by introducing greater flexibility and openness. The Japanese Diet passed legislation mandating nationwide electricity transmission coordination, full competition among retail electricity providers and the legal unbundling of HYPERLINK "javascript:void(0)"Japan's ten general electric utilities. Policymakers expect the reforms to give Japanese consumers more competitive and lower prices for electricity. Smart cities will benefit from this new flexibility in the transmission and selling of energy in the electricity market.

Japan introduced a Feed-in Tariff (FIT) system in July 2012 in an effort to promote the use of renewable energy. Since 2012, the most generous FIT has been offered to providers of solar energy, leading to a strong response by the private sector to develop this sector. The FIT for all sources of renewable energy is revised annually in response to changing market conditions. The development of renewable energy sources provides additional energy resources that can be harnessed for smart cities.

For the direct promotion of smart cities, from 2011to 2014, the Prime Minister's Office introduced national policies such as the new economic strategy or big-boned policy, which led to mushrooming "smart" projects with subsidies from numerous Ministries, including the Ministry of Economy, Trade, and Industry (METI), Ministry of Internal Affairs and Communications (MIC), Ministry of Environment (MOE). These GOJ agencies rushed to promote Ministry-mandated focused programs as the Ministry of Finance easily provided funding for them, though each one of these subsidies was relatively small.

**TOKYO, Japan**

Population Growth, 2013-2014:
**0.3%**

Total Employment, 2014 (Thousands):
**19,348 People**

Real GDP Growth 2013-2014:
**1.1%**

Employment Growth, 2010-2014:
**1.9%**

*Brookings Metro*

Some of the highest profile pilot projects were METI's flagship "next-generation energy and social systems test-bed" smart-city approach in the four centers of Yokohama, Toyota City, Keihanna (in Kyoto Prefecture) and Kitakyushu in 2010. The scope of the projects included elements for energy-efficient business and industry, energy-efficient homes, support for green consumer behavior, and a low-carbon transportation system. The projects concluded in March 2015.

Based on research by Nikkei BP Cleantech Institute, Japanese experts believe the smart-city market will reach at least a cumulative 5000 trillion YEN ($45 trillion) in value between 2011 and 2030. As of 2015, there were over 200 smart city projects in Japan. Japan's national government agencies alone are promoting over 160 projects. These 160 projects do not include those being led by the prefectural as well as the smaller local government level as well as private-sector-led initiatives. A January 2014 survey by the Kanto-area METI (the regional bureau) determined that

among the roughly 500 local governments in the entire region about 10% (44) were undertaking smart community initiatives.

In addition to subnational-government-led projects, Japan features a significant number of private-sector-led smart cities, towns, and communities. These include "smart towns" under development by Sekisui House and initiatives by Panasonic, Hitachi, Toshiba, and Mitsui Fudosan. These projects are funded by the larger companies on their own budgets, whereas there are also smaller companies operating with extensive financing from METI. Japanese smart city projects seem to be more focused on energy than projects elsewhere, most likely due to Japan's desire for energy diversification but have adapted to changing government priorities as the policies aimed at "Overcoming Population Decline" and "Vitalizing Local Economy" are hot now, so MIC is developing a smart project in that area. The above diversity of projects shows the myriad of opportunities available in the market.

## POTENTIAL FOR US COMPANIES

The smart city market in Japan seems to be a promising place for investment and cooperation by U.S. companies for several reasons. Efforts by smaller companies have the best potential for success because larger companies are less willing to work internationally. Unfortunately, working with Japanese companies on these initiatives seems to be difficult for smaller companies that do not have operations already in Japan. Much of the data pertaining to the cities is poorly accessible to those without significant understanding of Japanese. Many Japanese companies working on the projects have little experience working with companies from overseas, as such difficulties can come up when cooperation is attempted. In addition, it is necessary to develop local contacts in order to become familiar with local participants in projects and to begin to develop the long-term relationships that are necessary for success in Japan. Furthermore, Japanese companies are highly competitive in this space and there continues to be a strong desire in most projects to use Japanese goods and services, which has not helped international companies.

Any company interested in exporting to Japan should review the advice and guidance in the Department of Commerce's Japan Country Commercial Guide, which can be found at the link below.

Demographic changes of population reduction and aging have led to two decades of stagnant growth. As a result, Japan now confronts the challenge of rapid decoupling of growth and consumption. The development of smart cities, with a need to have a close interaction between the needs of community, government, and industry may be one next-generation energy solution for the new socio-economic arrangements. Any company interested in succeeding in Japan should be conscious of the strong role communities play in the development of smart cities and the need to find its role therein.

## OPPORTUNITIES

Including the opportunities resulting from Electricity Market Reform and the introduction of the FIT, the following component elements are essential in order to complete the Smart Grid in Japan:

1. Monitoring and Controlling System for Transmission Network and Distribution Network
2. Management of Distributed Power Sources
    a. (Photovoltaic Solar and Wind Power Generation)
3. Smart Meter
4. Smart Storage
    a. (Storage Batteries, Thermal Storage Equipment, Electric Vehicles, Air Compression Storage Facilities, Heat Pumps)
5. Demand Response
6. Smart Asset Management

## ADDITIONAL OPPORTUNITIES

- The Tokyo Olympics 2020 will bring in a lot of consumer spending that could help offset some of the building costs, and some of the publicity associated with the Olympics could be used to shed light on some projects.
- Japanese companies are already working on some projects within the United States, including projects in Maui, Albuquerque, and Los Alamos being planned by METI. These will provide an opportunity for U.S. companies to build relationships with their Japanese counterparts as well as study Japanese methods. Investment in these projects is upwards of 5 billion yen, and the Maui project is already operating in some capacity.
- U.S. companies seem to be taking advantage of opportunities opened up by smart initiatives more so than other countries. Several companies are already involved with smart city projects in Japan, most notably HP Japan in the Toyota Low Carbon Society. Texas Instruments, IBM Japan, and numerous others are also involved.
- Software components of cities, specifically cloud based programs, seem to be less developed in Japan compared to elsewhere, which could be an opportunity for American companies.
- Commercial Service Japan annually holds a one-on-one business matchmaking event between U.S. firms and Japan's electric power companies. The event is called New Orleans Association (NOA) Conference, which is held in May. At the Conference, CS Japan provides an opportunity for representatives of U.S. suppliers of non-fuel materials (and their Japanese agents) to sit down in individual meetings with procurement managers from Japan's twelve Japanese electric power companies (10 major utilities and 2 wholesalers), all in one place. This is the only event in Japan where U.S. firms could meet all Japanese electric power companies. The 30th NOA Conference was held successfully on May 19, 2016. For the date of the 2017 event, contact Takahiko Suzuki at takahiko.suzuki@trade.gov

## UPCOMING EVENTS CALENDAR

- September 7-9, 2016: World Smart Energy Week – Osaka
- March 1-3, 2017: World Smart Energy Week – Tokyo

## WEB RESOURCES

- Agency for Natural Resources and Energy (ANRE), Ministry of Economy, Trade and Industry (METI), Government of Japan (GOJ); http://www.enecho.meti.go.jp/en/
- METI's initiative for smart communities; http://www.meti.go.jp/english/policy/energy_environment/smart_community/pdf/201402smartcomunity.zip
- Smart City portal; http://www.meti.go.jp/english/policy/energy_environment/smart_community/index.html#press
- Private consortium on Smart City; http://www.smartcity-planning.co.jp/en/index.html
- Department of Commerce Japan Country Commercial Guide; http://www.export.gov/ccg/japan090820.asp

## RESOURCES

- http://apjjf.org/2014/11/24/Andrew-DeWit/4131/article.html
- http://www.triplepundit.com/2015/10/japan-smart-cities-project-wraps-impressive-results

# Kenya Smart Cities Guide

## SMART CITY OVERVIEW

With increased urbanization and increasing economic opportunities, the need to transform Nairobi into a smart city is urgent. The city's infrastructure and systems are already struggling to support its existing inhabitants, even before the population swells to over 5 million by 2020. This rapid growth sets challenges in key areas such as transportation, utilities, safety and urban planning. Kenya's population in 2011 was at 40.5 million, and is expected to sky rocket to 63 million by the year 2030. The rate of migration to urban cities is on the increase and the city's capacity will be overstretched in the next few years.

Kenya remains at the forefront on Information communications technology (ICT) and is one of the fastest growing business sectors with highest Internet access rates in the Sub Saharan region. While Kenya's physical infrastructure is also superior in many cases to that of its neighbors, it remains undeveloped and a key obstacle to economic development. Developing a 24- hour economy in the city center would be good for efficiency and attractive for investors.

A key area that Kenya is leading the way is mobile technologies. Kenya has become a pioneer in mobile payment and money transfer systems creating some of the world's most innovative technologies and services in the field. The potential for mobile technologies is limitless when it comes to creation of better functioning infrastructure and also presents great opportunities for getting people connected and contributing to the city's development. It is therefore important for Nairobi to leverage on existing technologies and systems in order to transform itself into a smarter city.

In 2011, IBM sponsored the Nairobi Smarter Cities roundtable which resulted in ideas and strategies from both private and public sector, to create long term solutions to imminent problems. Some of the recommendations from the roundtable require further debate while some are already at the implementation phase.

## KEY INITIATIVES (BY SECTOR)

### SMART ENERGY

Despite East Africa being relatively rich in natural resources and alternative energy sources, Kenya's systems for the production and distribution of energy require significant transportation and investment. This is most apparent in urban areas where mass consumption of energy places tremendous strain on ageing infrastructure and where the economic impact of energy unreliability is felt the greatest.

According to the Kenya Electricity Generating Company (KENGEN), Nairobi suffers from 11,000 high voltage fluctuations and power outages every month. Kenya's Energy Regulatory Commission (ERC) estimated they would be able to generate about 27% of the country's electrical power from geothermal sources by 2013. Ultimately, energy is a key threat to Nairobi's future. As the roundtable highlighted, nearby all smarter city initiatives depend on a reliable, cost-effective supply of energy.

Some of the suggested ideas for Nairobi's energy system are:

- Seek alternative energy supply sources such as solar and wind power generation in order to meet the growing demand for power and minimize over reliance on hydroelectric power sources.
- Introduce Smart meters and other technologies that can be used to help energy users better understand their own consumption patterns and create efficiencies.

- Public private partnerships between government and companies to cooperate to solve Nairobi's energy challenges.

### SMART TRANSPORTATION

Driving in Nairobi during peak periods is very hectic and painful. Every morning about 1.5 million people pack thousands of cars and mini-bus taxis (Matatus), and battle their way into the Central Business District. Inefficiency is exacerbated by the fact that over 75% of the city's drivers are alone in their cars- a figure among the highest in the world. The car- pool system has also not gained popularity in Kenya, and often a household will use multiple cars to go on more or less the same route. It takes an average of 31.7 minutes to find a parking spot, against a global average of 19.8 minutes.

Beyond economic costs, traffic creates a lot of stress and frustration. The 2011 IBM Commuter Pain study estimates Nairobi has the world's fourth most painful commute. Infrastructure is gradually improving but perhaps not fast enough. An efficient cost effective public mass transit system would probably do the most alleviates traffic congestion in Nairobi, but it needs to be the right system.

Some of the suggested ideas for Nairobi's transport system

- Enforcement of strict traffic laws and automation of penalties for traffic violators, which is often the main cause of congestion
- Investment in a large-scale public transport system has the greatest potential to address NAIROBI'S traffic and transportation issues.
- Nairobi's road developers should consider collaborating with the energy sector to tap into new techniques that use roads to help generate energy.
- Pricing road usage appropriately might help reduce traffic. Privately managed toll roads and city zones could be developed-revenue raised could be reinvested into the city's road and transportation system.
- Mobile phone signal density could be a way of pinpointing and predicting traffic problems. Over 70% of Kenyans have mobile phones.

Other key sectors that are under consideration are security and emergency services as well and digitization of public records. Alongside state run emergency services, many of the city's residents have come to rely on private security companies which provide rapid response services for fire, medical and security emergencies. It is reported that nine out of ten calls to state emergency response units go unanswered which translates to increased loss of life and property.

Coordination, integration, and communication are the most common problems when it comes to public service delivery in these areas. The use of data analytics to more effectively make intelligent decisions based on high quality and real – time information is critical for public information systems.

## CHALLENGES

Some of the challenges currently facing supply of smart goods and services include:

### MARITIME AND INLAND WATERWAYS TRANSPORT:

- This is the key linkage for the EAC to the rest of the world.
- There is ineffective utilization of inland waterways, a setback to closing the logistics infrastructure.
- The cost of container transport within the EAC is very high, thus remains a challenge
- Stiff demurrage penalties lead to high costs of doing business across the region

### RAILWAY TRANSPORT:

- Key to efficient and effective movement of raw materials, and refined goods and services.
- Key regional corridors are performing poorly and if not revamped are a liability to the region's growth prospects.

### AIR TRANSPORT:

- The main airport hubs are Jomo Kenyatta International Airport, Dar es Salaam, Entebbe, Kigali, and Lokichoggio Airports.
- Safety of the airspace and high costs of cargo remain a challenge

### ROAD TRANSPORT:

- Currently the main mode of transport for goods across the region.
- On its own, it renders costs of freight and speed of movement unfavorable to competitiveness of the region.
- Poor road network often results in delays in the movement of goods and services
- Overloading of freight vehicles often leads to breakdowns further resulting in loss of revenue

## FEATURED CITIES AND/OR PROJECTS

Konza City and Tatu City are new, small-scale smart cities close to Nairobi. Konza city is a governmental led technology city targeting businesses and commercial developments, while Tatu City is a private sector-led mixed-use environment that will be home to an estimate of 62,000 residents and 23,000 daily visitors.

These cities are the newest and smartest cities in Africa built with understanding of better urban planning, management, better living, better infrastructure, better roads and better transport incorporating the latest technologies. It is hoped that these will provide lessons and case studies that will inform Nairobi's future development. Additionally, their close proximity to the main city means they may serve as satellite cities, relieving pressure on Nairobi's Central Business District.

**Konza City Technopolis:**

In 2008, the Government of Kenya (GOK) approved the creation of Konza Technology City as a flagship Kenya Vision 2030 project. Vision 2030 aims to create a globally competitive and prosperous nation with a high quality of life by 2030. As part of this vision, Konza will be a sustainable, world-class technology hub and major economic driver for Kenya. Konza was initially conceived to capture the growing global Business Processing Outsourcing and Information Technology Enabled Services (BPO/ITES) sectors in Kenya.

The GoK hired the International Finance Corporation, a member of the World Bank, to advise on the development and implementation of a world-class technology city, which would grow the BPO/ITES and other technology industries in Kenya. The GoK also commissioned feasibility studies that demonstrated the viability of Konza, the focus on BPO/ITES, and its potential contributions to local economic development.

In 2014, GOK through the Konza Technology City Development Authority (KOTDA) signed a 5-year Master Delivery Partner 2 (MDP2) Agreement with a consortium led by major international civil engineering firm Tetra Tech (Denver, USA) to develop the 400-acre Phase 1 of Konza Technology City.

In a demonstration of expanding technology to bridge infrastructure operations and improve service delivery to citizens, the Techno City has embarked on development of Phase 1 to world-class smart city building standards using smart technology solutions.

Smart concepts will be designed into the City using state-of-the-art Internet and telecommunications networks to enhance the city's efficiency and integrate infrastructure and services. Konza City will use a single converged Internet Protocol (IP) network as the platform to plan, build, and manage day-to-day city operations. The Konza IP network will allow for significant new efficiencies in every aspect of life within Konza, enhancing productivity, improving availability of, and access to public services.

Smart technology in Konza City will be integrated in Transportation Operations, Sanitary Collection, Treatment & Re-use Operations, Storm Drainage Operations, Water System Operations, Electrical System, E-Governance Data Centers, Security Parking, and Informational Signage Landscaping.

The Techno City will harbor the Konza Campus, a shared ICT platform for education systems for both local and international universities. Excellent ICT infrastructure poised to make Konza City an e-government commerce giant targeted at government agencies and the private sector would vastly improve efficiency and citizen services through cloud-based IT infrastructure.

Upon completion of Phase 1, Konza City is expected to create over 20,000 direct and indirect jobs. The Technopolis is expected to host various amenities including ICT research centers, a university complex, offices, residential houses, and parks. The city will be implemented as a public-private partnership, in which the Government will take a minimal role, developing the public infrastructure and regulatory guidelines.

Some of the salient features that will be offered by Konza Technology City include:

- Roads - Two roadways will provide access to Konza Technology City.
- Water and Wastewater - Konza Technology City is committed to sustainable water use. Konza will lay out a water reuse system, which will include a tertiary treatment plant where treated water will be used for irrigation and cooling. All buildings in Konza will be required to incorporate the latest water management systems in their designs.
- On-site Transit - Konza will be a walkable, bikeable, and transit-friendly city. A bus transit network will provide service along the main east-west axis in Phase 1, and will be extended in future phases. A transit hub next to the A109 interchange will be the primary station for Konza.
- Power - Residents and businesses located at Konza will enjoy a steady and reliable electrical supply to be provided by three independent power sources. The City will be connected to two independent distribution lines, the first being a 400kV line running 40 kilometers west of Konza and a 132 kV line running adjacent to Konza. On-site solar power generation is also under consideration.
- Communications - Konza' s strategic location will allow the city to be directly connected to all four underwater fiber optic cables in Kenya. These high capacity lines will ensure high connection speeds, allowing companies and residents to enjoy video, data, and voice Internet capabilities. The city's privileged location also ensures access to any further improvements in Kenya's fiber optic infrastructure.
- Real Estate Development - KoTDA will lease plots to private real estate developers that meet design guidelines and provide a sustainable economic model.
- Operations and Services - KoTDA will provide the majority of city services, but may contract with service providers on an as needed basis. All services provided will operate at world-class standards and employ cutting edge green technology.

## UPCOMING EVENTS CALENDAR

- October 2016: Smart Cities Africa – Johannesburg, South Africa
- November 15-17, 2016: AfriCom 2016 – Cape Town, South Africa

## RESOURCES

- Kenya Country Commercial Guide 2015
- IBM Report – Nairobi Smarter Cities Roundtable, 2011
- www.konza.go.ke

# Malaysia Smart Cities Guide

## SMART CITY OVERVIEW

Malaysia, a middle-income country, has transformed itself since the 1970s from a producer of raw materials into an emerging multi-sector economy. Malaysia is currently attempting to achieve high-income status by 2020 and to move further up the value-added production chain by attracting investments. The Eleventh Malaysia Plan (11MP), 2016-2020, is the last leg of the nation's development strategy for achieving its goal of becoming a high-income nation. The 11MP focuses heavily on sustainable and smart growth, including through upgrades in its energy, water, waste, transportation, information and communications technology (ICT), and building infrastructure.

Malaysia's sustained growth has enabled significant investment in public infrastructure. The Malaysian Government also encourages private sector participation and investment in the development of smart cities infrastructure. Funding via Public-Private Partnerships (PPP) or Privately Funded Initiatives (PFI) is commonly used as an alternative procurement method for the public sector in the development and maintenance of infrastructure. The Public Private Partnership Unit under the Prime Minister's Department oversees PPP and PFI programs.

Currently, three out of four people live in cities or urban regions, and urban populations are estimated to grow by 2.6% per year. The population has extremely high rates of mobile cellular penetration, with nearly 150 mobile subscriptions per 100 people. Of these mobile subscribers, 53% use smartphones. While 67.5% of the population uses the Internet and an estimated 60% have access to broadband, only 10% of households have fixed broadband subscriptions.

## KEY INITIATIVES (BY SECTOR)

### SMART ENERGY

**Electricity transmission:**

Malaysia plans to provide 7,626 MW of new energy generation capacity in Peninsular Malaysia, along with 300,000 bpd refining capacity at Pengerang Integrated Petroleum Complex (PIPC) in Johor, providing security to Malaysia's energy needs. In addition to implementing smart grid technologies, the government will also pursue and promote co-generation technologies for combined heat and power.

**Smart Grid:**

Tenaga Nasional Bhd (TNB), Malaysia's national electricity utility company, has been pursuing the use of smart grid technology in order to reduce energy consumption. Currently, the project is in its pilot phase, but TNB hopes to install the smart meters in each of the 8.5 million household customers within 10 years. There are opportunities for U.S. companies operating in the smart grid sector. Subsectors of interest include Transmission & Distribution (T&D) equipment and Smart Grid ICT. In ITA's *2016 Smart Grid Top Markets Report*, Malaysia ranked 6th as a destination for T&D equipment and 21st for ICT products.

### SMART WASTE AND WATER MANAGEMENT

**Water:**

Malaysia aims to provide 99% of the population with clean and treated water by 2020. As of 2015, approximately 95% of the population have access to clean and treated water. The Government remains committed to expanding coverage and improving the quality of the water services industry nationwide.

**Sewerage:**

Malaysia's wastewater and sewage treatment segment lags behind its drinking water counterpart in terms of development. Currently, only 56% of the population is served by a wastewater treatment plant, with the remainder relying on septic tanks and pour flush systems. The Government of Malaysia aims to provide 80% of the population with connected sewerage services by 2020. The National Water Services Commission (SPAN) will develop the National Sewerage Master Plan to provide integrated and holistic long-term policy directions and strategic shifts for the sewerage services industry. Alternative financing methods based on privatization concepts will be further promoted as a new source of capital.

## SMART MOBILITY

Transportation emissions account for 27% of Malaysia's greenhouse gas burden. In 2014, public transportation accounted for 17% of total transportation in the Greater Kuala Lumpur / Klang Valley area. Malaysia aims to increase public transit's share of all trips to 40% in Kuala Lumpur and other major urban areas, and 20% in smaller cities.

Malaysia is committed to improving transportation networks in order to enhance connectivity and mobility. This includes the construction and upgrading of roads and highways such as the Pan Borneo Highway. Further, under the National Land Public Transport Master Plan 2012-2030, Malaysia aims to expand its public railway systems, including the expansion of Light Rail Transit (LRT) Lines and the development of a Kuala Lumpur-Singapore High-Speed Rail. Efforts are also underway to enhance and streamline integration of land public transport services within Greater Kuala Lumpur.

Malaysia is also working to introduce an integrated smart ticketing system for public transport. The smart ticketing system would aim to reduce costs and simplify travel for intermodal transit users.

## SMART BUILDINGS

Malaysia is committed to expanding and upgrading broadband infrastructure through deploying broadband as an essential service, improving connectivity from international to last-mile connections, and integrating digital infrastructure planning.

An amendment in 2011 to the 1984 Uniform Building By-Laws (UBBL) stipulates that communication installations is one of the essential services similar to water and electricity under the certification for completion and compliance of buildings. According to the Government of Malaysia, eight states -- Johor, Kelantan, Melaka, Pahang, Perak, Perlis, Selangor, and Terengganu -- have tabled the new UBBL requirements and will be fiber-ready by 2018. The remaining five states will be encouraged to comply with the UBBL requirements.

The government has committed to ensuring the efficient use of energy in buildings, industries and households.

## FEATURED CITIES AND/OR PROJECTS

**Cyberjaya:**

Population: 86,000
City Resources: Cyberview Sdn Bhd:
http://cyberview.com.my/
(ccm@cyberview.com.my)

Cyberjaya was launched in 1997 as a fully integrated city, and Malaysia's pioneer tech hub. Cyberjaya is planned as a smart city for the ICT and multimedia industry, with planned projects to cover areas such as infrastructure, environment, and economy. Cyberjaya is the nucleus of the Multimedia Super Corridor (MSC), a special economic zone dedicated to attracting high-technology companies and grooming the local ICT industry. Fully supported by the Malaysian Government, Cyberjaya aims to be known as the Silicon Valley of Malaysia. As a result of the expansion of the city and availability of employment opportunities, the city is set to see the population grow to 210,000 by 2020.

**Greater Kuala Lumpur (GKL)/Klang Valley (KV):**

Population: 6.8 million
City Resources: InvestKL: http://www.investkl.gov.my/

The Greater Kuala Lumpur (GKL) / Klang Valley (KV) region includes the capital city of Kuala Lumpur and nine other municipalities. It is the fastest growing region in Malaysia and the commercial heart of the country. The GKL/KV area has been identified as a National Key Economic Area (NKEA). NKEA is defined as an important driver of economic activities that push Malaysia towards its Vision 2020 goals and economic growth, as measured by increasing Gross National Income (GNI). As a part of the NKEA program, the Malaysian Government aims to create 300,000 new jobs in the GKL/KV area through implementation of nine "Entry Point Projects" (EPPs), which include projects such as attracting multinational firms, attracting human capital, and pursuing smart city development.

**Iskandar Malaysia:**

Population: 1.6 million (est.)
City Resources: Iskandar Regional Development Authority: http://www.irda.com.my/

Iskandar Malaysia is a development corridor in the southern state of Johor. In an effort to anticipate and plan for future growth, the Government of Malaysia identified the region of Iskandar as a key development area. In 2014, the Malaysian Government launched the Iskandar Malaysia development program as a pilot for Smart City projects in Malaysia.

The Government of Malaysia committed $22.5 billion for development of the economic corridor, and has invested only $11.7 billion of the total committed sum. The Government has built 1,500 units of affordable homes and has established a local bus program, with 34 buses serving 17 routes.

## UPCOMING EVENTS CALENDAR

July 13, 2016: World Smart City Forum – Singapore; http://www.worldsmartcity.org/

October 18-19, 2016: Smart Cities Asia 2016 – Kuala Kumpur; http://www.smartcitiesasia.com/

March 2017: Internet of Things Asia – Singapore; http://www.Internetofthingsasia.com/

## KEY ORGANIZATIONS

Economic Planning Unit (EPU),
Prime Minister's Department
www.epu.gov.my

Ministry of Energy, Green Technology, and Water (KeTTHA)
www.kettha.gov.my

Ministry of Communications and Multimedia (KKMM)
http://www.kkmm.gov.my/

Land Public Transport Commission (SPAD)
http://www.spad.gov.my/

National Water Services Commission (SPAN)
http://www.span.gov.my/index.php/en/

Malaysian Industry-Government Group for High Technology (MiGHT)
www.might.org.my

Malaysia Digital Economy Corporation (MDEC)
www.mdec.my

Public Private Partnership Unit (UKAS), Prime Minister's Department
http://www.ukas.gov.my/web/guest/home

## WEB RESOURCES

11th Malaysia Plan:
http://rmk11.epu.gov.my/index.php/en/

National Land Public Transport Master Plan:
http://www.spad.gov.my/sites/default/files/national-land-public-transport-master-plan-final-draft.pdf

Malaysian Investment Development Authority (MIDA): http://www.mida.gov.my/home/

InvestKL: http://www.investkl.gov.my/

Iskandar Malaysia: http://www.iskandarmalaysia.com.my/SCIM/index.html

Iskandar Regional Development Authority:
http://www.irda.com.my/

Cyberjaya: http://www.cyberjayamalaysia.com.my/

## RESOURCES

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# Mexico Smart Cities Guide

## SMART CITY OVERIVEW

Between Mexico City, Guadalajara and Puebla, Mexico is coming around to the importance of integrating smart technologies into their major cities and with the liberalization of the energy sector, Mexico is adopting various new smart initiatives into their energy markets.

In Mexico, the Green Plan has been developed where the local government wants to invest 1 billion dollars in 26 strategies and 113 specific actions over the next 15 years to improve the sustainability of Mexico. Some measures include restoring soil conservation, improving public spaces and controlling atmospheric pollutants. Up to 21 departments or secretariats, including that of Tourism, Health and Finance, have been involved in this program.

Mexico City's investments in conservation initiatives including smart building construction and design, digitization of government services, and air quality improvement have earned it a reputation as a smart and sustainable city.

## KEY INITIATIVES (BY SECTOR)

### SMART ENERGY

In a market that is valued at more than US$10 billion, Mexico is the second largest consumer of smart grid technology behind Brazil in Latin America. Mexico's US$10.9 billion smart grid infrastructure investment will see significant deployments across a number of market segments including smart metering, distribution automation, battery storage, home energy management, information technology and wide area measurement.

There have recently been more than two million smart meters installed in the country.

Mexico was the first country worldwide to implement a Nationally Appropriate Mitigation Actions (NAMA) study and is meant to raise donor funding for upscaling Mexican efforts in energy efficient housing by showing energy efficient building concepts that are cost effective, proven to successfully reduce CO2 emissions and, at the same time, are adapted to the particular Mexican climate and conditions.

**MEXICO CITY, Mexico**

Population Growth, 2013-2014:
**1.3%**

Total Employment, 2014 (Thousands):
**9,053 People**

Real GDP Growth 2013-2014:
**2.8%**

Employment Growth, 2010-2014:
**1.9%**

*Brookings Metro*

As part of the High Level Economic Dialogue, U.S. and Mexican business leaders began to explore how a Smart Cities Framework might be applied to transform the operation of the U.S.-Mexico border and improve economic and social conditions for nearby communities. A Transformation Working Group, chaired by Cisco and supported by Deloitte as an advisor, developed the Cross Border Connected Cities (CBCC) Concept, articulating a broader vision for border operations within an urban planning and Smart City context.

### SMART TECHNOLOGY

Ciudad Creativa Digital Project (CCD) seeks to integrate Guadalajara's urban environment with innovators interested in working in a wide variety of digital media industries.

The Mexico DF open data portal offers more than 1,000 datasets in several subjects, including public transport, shopping, education, culture, health, civil protection, environmental issues and public services. Open data have enabled citizens to develop applications for administrative processing, such as paying their property taxes on property on flats, houses or offices); paying for traffic tickets (fines); sending requests for road construction and landscaping, reports on water

leakages, monitoring traffic congestion and finding alternative routes, and checking city's air quality.

The city of Puebla has managed to monetize waste thanks to the 'Eco wallet'. This program consists of depositing waste in a collection center, where it is weighed and a proportional sum of eco-money is paid to the depositor. This eco money, called "pecos", is redeemable at numerous affiliated establishments. This project has saved 12,500 trees, 7,500 barrels of oil and 60,000 cubic meters of water and has avoided 14,600 tons of CO2 being emitted.

A little over a year ago, the government and some private institutions in Querétaro, started the IQ Smart City project in *Ciudad Maderas, El Marqués* municipality, (10 minutes away from Mexico City). Using Internet and cell phone technology, the project aims to interconnect a 400-hectares of residential and commercial areas, technology companies, schools, malls, hotels, a hospital, parks and the Diocese of Querétaro with an ecological infrastructure and sustainable energy sources.

### SMART TRANSPORTATION

Mexico City has adopted various smart mobility initiatives including the introduction of a free program Velo "Ecobici", a bicycle sharing program, a sustainable city bus network and shared electric cars.

## UPCOMING EVENTS CALENDAR

November 15-17 2016: Smart City Expo Puebla

# The Netherlands Smart Cities Guide

## SMART CITY OVERVIEW

The Netherlands is making progress in implementing smart cities. Research by the European Parliament places the country in its second tier of European countries that have successfully implemented smart cities, meaning 51-75 % of its cities with a population over 100,000 have at least one smart city initiative.

A catalyst for smart cities is the Dutch government's Clean & Efficient Program, which lays out the national climate policy framework. Under this program, the government has established four primary targets:

- Reduce greenhouse gas emissions by 30% from the 1990 level by 2020
- Increase the share of renewables in the energy mix by 20% by 2020
- Achieve annual energy efficiency improvements of 2% by 2020
- Make a big step in the transition towards a more sustainable energy system by 2020.

## KEY INITIATIVES (BY SECTOR)

### SMART MOBILITY

There is a large installed base of ITS applications for roads, railways and waterways in the Netherlands. Government, industry and research institutions are making major investments in various systems and services to improve existing networks and support smart mobility. In the past, the focus was on developing tools. Now, the focus is on deployment and the removal of barriers, with the aim to improve the efficiency of transport systems and matching user demands.

Various programs and projects on travel information, cooperative and automated mobility and dynamic traffic management are currently running in different regions and cities. Solutions are aimed at improving both urban and interurban mobility and cross-border mobility. The Netherlands has a strong industrial base throughout the value chain of smart mobility, with key players like TomTom, Here, NXP, TASS International, CGI, Siemens, Imtech and Vialis, as well as many SMEs. In addition, knowledge institutes like TNO and several universities have advanced research programs on smart mobility.

The Amsterdam and Eindhoven regions are frontrunners in the deployment of smart mobility solutions.

**ROTTERDAM, Netherlands**

Population Growth, 2013-2014:
**0.42%**

Total Employment, 2014 (Thousands):
**3,740 People**

Real GDP Growth 2013-2014:
**0.02%**

Employment Growth, 2010-2014:
**-0.4%**

*Brookings Metro*

### SMART INFRASTRUCTURE

A Dutch project to turn the nation's bike paths into energy-generating solar roadways has cleared its first major test with flying colors. SolaRoad's 70-meter test track near the town of Krommenie outside Amsterdam has generated over 3,000 kilowatt-hours over its first six months of operation, or "enough to provide a single-person household with electricity for a year." That translates to 70 kwh per square meter of solar road per year, which the designers predicted as an "upper limit" during the planning process.

The project called Glowing Lines, absorbs energy during the day, and glows in the dark. It is a safe and suitable alternative to conventional lighting for dark roads.

### SMART CITIZEN

The Smart Citizen Kit was devised out of growing concerns of citizens about the quality of their air. This Kit requires the involvement of 'ordinary

people' in the measuring process. In this project, Waag Society and ASC installed a network of sensors throughout Amsterdam. The Kit can measure humidity, noise pollution, temperature, CO, NO2, and light intensity. The Kit takes measurements and conveys the results though the Internet connection of the participant.

### SMART ENERGY

The implementation of smart energy grids in the Dutch consumer market is worth between $1.07 billion and $3.75 billion, according to a study carried out as part of a smart grid pilot project in the Netherlands.

## CHALLENGES

There are no challenges or market access barriers for Smart City goods and services coming from the U.S., which are unique to the Netherlands.

## FEATURED CITIES AND/OR PROJECTS

**Amsterdam:**

Amsterdam is the 5th smartest city in the world, and second most tech-intelligent, according to the Cities in Motion Index, a ranking of the smartest cities based on factors like urban planning, technology, the economy, and the environment.

Amsterdam Smart City (ASC) is a unique partnership between companies, governments, knowledge institutions and the people of Amsterdam. It is a frontrunner in the development of Amsterdam as a Smart City. In six years ASC has grown into a platform with over 100 partners, which are involved in more than 90 innovative projects. See: http://amsterdamsmartcity.com/

With its ambition to be the world's leading nucleus for innovative smart city and smart stadium solutions, the Amsterdam ArenA Innovation Center (AAIC) offers effective resources for research, development and education. The Innovation Center supports global leading players in creating their newest innovations for smart experience and smarter living environments on a global scale. http://www.amsterdamarena.nl/innovation-center-2.htm

Amsterdamse Zoncoalitie is a coalition initiative between solar (panel) suppliers, energy companies, network owner Alliander, Amsterdam Smart City and the municipality of Amsterdam. The city has about 800 hectares of roof space that can accommodate solar panels.

http://amsterdamsmartcity.com/projects/detail/id/145/label/amsterdamse-zoncoalitie

The Edge building in Amsterdam is one of the world's most sustainable and 'smartest' buildings, able to constantly monitor its energy consumption and adapt through new technologies and innovation. OVG Real State worked in close partnership with the building's principal occupier, leading global professional service firm Deloitte and AKD, a notary and legal firm. The Edge was the first building using the Philips' Ethernet-powered LED connected lighting, which enables employees to use a smartphone app to regulate the climate and light in their individual workspaces. http://www.bloomberg.com/news/videos/2015-09-23/see-the-world-s-greenest-office-building-the-edge

**Eindhoven:**

Eindhoven is the center of the "Brainport Region", and is one of the three top economic engines of the Netherlands, delivering about 14 % of national GDP.

The former Philips industrial complex will become a creative smart district. An innovative concept to clean up contaminated land will double as a means of producing energy. A district- wide ICT solution will allow residents to access different kinds of infrastructure, such as booking electric vehicles from a district car sharing scheme or using smart parking concepts.

SmartLighting/SmartGrid Tender. The city has taken a lead in Europe with a tender aimed at procuring a LED public lighting solution for the next decade. A competitive dialogue process has been started up, out of which best value procurement will be created. Five cities have partnered up:

Eindhoven, Stavanger, Bassano del Grappa, Espoo and Malmö. The purpose of the exercise is to enable continuous and ongoing open innovation, ensuring that whatever market party is selected they use a Living Lab approach and collaborate with other businesses, knowledge institutions, government and residents. Dialogue is currently being conducted with 4 potential suppliers.

**Rotterdam:**

Rotterdam was awarded Smart City status in 2014 by the magazine The New Economy. The city won the award based on its efforts to protect itself against climate change and bolster its image as the most sustainable port city in the world. Its construction of 'water plazas' and green roofs, as well as the city's transport network, were cited as the most notable examples. Rotterdam's approach to water has made it the most prominent and innovative water-knowledge city in the world, as well as an inspiring example to other delta cities."

Collaborating with prominent partners, Rotterdam has developed a Climate Change Adaptation Strategy which has generated innovative approaches that are now being emulated across the world. Additional water storage in new construction, specially designed water plazas, many square of green roofing and a knowledge center for floating construction demonstrate how a densely populated urban environment like Rotterdam can respond to heavy rainfall and rising water levels in a smart way. In addition, these measures contribute to the greening of outdoor spaces, and make the city more attractive for its residents.

## UPCOMING EVENTS CALENDAR

- December 8, 2016: Intelligent Sensor Networks Conference – Eindhoven
  www.isnconference.com

  The Intelligent Sensor Networks Conference will focus on three key themes: smart infrastructure, smart industry and smart logistics. Presentations will cover a range of topics including big data from little sensors, machine learning, crowd sensing and uncovering insights.

## RESOURCES

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www.export.gov/netherlands

# Panama Smart Cities Guide

## BASIC DATA ON THE ECONOMY

GDP per capita (PPP; 2015): $ 21,800

Major urban areas: Panama City - 1.673 million

Population (July 2015): 3,657,024

Industries: construction, brewing, cement and other construction materials, sugar milling

## SMART CITY OVERVIEW

Panama City is the largest city in Panama, comprising about half of the country´s population. Panama has no strategy or plans for smart city implementation. The United Kingdom, Spain, and Germany have offered some assistance for smart city developments but nothing has materialized yet. The Panama City Mayor is interested in smart cities technologies.

## KEY INITIATIVES (BY SECTOR)

There have been a number of isolated initiatives such as:

- LEED programs for buildings
- Incentives for energy efficiency
- Smart grid initiatives,
- Electronic surveillance in certain areas of Panama City
- Implementation of a Geographical Information System
- Metro construction

These initiatives are not part of a comprehensive program. The World Bank has offered consulting services on smart cities implementation.

## FEATURED CITIES AND/OR PROJECTS

There are no current projects aimed specifically at Smart City implementation.

## UPCOMING EVENTS CALENDAR

There are no specific shows/events addressing Smart City.

# Peru Smart Cities Guide

## BASIC DATA ON THE ECONOMY[87]

GDP per capita (PPP; 2015): $12,200

Major urban areas (2015): Lima – 9.897 million; Arequipa – 850,000; Trujillo – 798,000

Population: 30,444,999 (July 2015)

Industries: mining and refining of minerals, steel, gas and petroleum extraction and refining, fishing, agriculture

## SMART CITY OVERVIEW

Peru's national economy is dominated by its mining operations with almost 60% of its total exports being metals and minerals.[88] Peru has continued to support free trade policies to facilitate their exports and was a signatory to the Trans-Pacific Partnership. Peru unfortunately lacks many of the smart city development indicators. Its urban population is 78.6%, which is lower than most regional neighbors like Chile, Brazil, or Argentina.[89] It also has substantially fewer Internet users with only 40.9% of the population having access in 2014.[90] The Institute of Higher Business Studies (IESE) ranked Peru 103rd in the world for smartest cities.[91] Rising crime rates and increased traffic represent a few barriers to smart city development.[92] Despite these negative indicators, Peru has taken some steps toward innovating its cities.

## KEY INITIATIVES (BY SECTOR)

### SMART TECHNOLOGY

ICT: In 2011, the Peruvian government announced its Agenda Digital Peruana 2.0, an effort to enhance ICT technology and transform Peru into an information-based society. Some of its more specific objectives include promoting scientific research, increasing productivity and competiveness using ICT, and allowing citizens more access to social services and participation in the information society. The Ministry of Transport and Communications (MTC) has the primary responsibility of implementing these goals.[93]

### SMART DISASTER RESPONSE

Due its mountainous terrain and high amounts of seismic activity, Peru is prone to natural disasters such as earthquakes and landslides. The National Emergency Operations Center (COEN) collects disaster information from other organizations to determine disaster levels and promulgate information to the public electronically.[94]

### SMART CONSTRUCTION

In 2015, the Peruvian government approved the Technical Code for Sustainable Construction as part of the commitments made by Peru during

[87] All basic data is from the CIA World Factbook: https://www.cia.gov/library/publications/the-world-factbook/geos/pe.html

[88] Id.

[89] Id.

[90] Id.

[91] http://www.peruthisweek.com/news-lima-ranks-103-in-world-list-of-smart-cities-106925

[92] https://www.mtc.gob.pe/comunicaciones/regulacion_internacional/info_nacional_internacional/documentos/Consultation%20on%20Developing%20ICT%20Infrastructure%20for%20Smart%20Cities%20in%20Peru_2....pdf

[93] Id.

[94] https://www.mtc.gob.pe/comunicaciones/regulacion_internacional/info_nacional_internacional/documentos/Consultation%20on%20Developing%20ICT%20Infrastructure%20for%20Smart%20Cities%20in%20Peru_2....pdf. See also: http://www.indeci.gob.pe/contenido.php?item=MTYz

the COP20 held in Lima in 2014. This code was designed between various public and private entities that are part of the Permanent Committee on Sustainable Construction formed by the Ministry of Housing, Construction and Sanitation (Chair), the Ministry of Environment (Technical Secretariat) and twelve (12) specialized entities on design, construction and real estate sector. Code implementation will be gradual over time and plans to start in the main cities of Peru this year. This norm aims to improve the technical criteria for the design and construction of public and private edifications in order to be classified as sustainable.

## FEATURED CITIES AND/OR PROJECTS

**Lima:**

- Due to rising traffic levels, the city of Lima established a traffic control center (GTU-MML) in 2011 to collect real-time data and manage traffic congestion. The organization manages over 320 major intersections and collects data every 15 minutes.[95]
- The National University of Engineering recently hosted the event "Startup Weekend Smart Cities Lima" in April of 2016.The event attracted students and young entrepreneurs to work on projects and share ideas concerning sustainable cities.[96]
- Ametic, an association of Spanish tech firms, held a November 2015 showcase in Lima for public officials to discuss the Spanish model for making cities smart.[97]

**Trujillo:**

- The city of Trujillo hopes to implement a unified emergency management center with a universal telephone number, and to integrate data collection to improve crime prevention.[98]

**Cuzco:**

- Cuzco officials met with government representatives of Singapore to discuss Cuzco's smart city capability in October 2015.[99]

## UPCOMING EVENTS

- July 7-9, 2016: Tecnoagro Peru will occur to publicize business opportunities for applying technological solutions to the agricultural sector – Lima
- August 13, 2016: The Renewable Energy Congress for Mining will be meeting to discuss how remote technology and renewable energy can help lower costs for mining operations.
- August 25-28, 2016: Expo Energy Efficiency will be held. This fourth edition of the show aims to be a meeting place for companies linked to the renewable energy sector – Lima; www.lesexpoperu.com

[95] https://www.mtc.gob.pe/comunicaciones/regulacion_internacional/info_nacional_internacional/documentos/Consultation%20on%20Developing%20ICT%20Infrastructure%20for%20Smart%20Cities%20in%20Peru_2....pdf

[96] http://www.up.co/communities/peru/startup-weekend/8592

[97] http://www.efe.com/efe/english/technology/spanish-firms-showcase-smart-cities-innovations-in-peru/50000267-2772470

[98] https://www.mtc.gob.pe/comunicaciones/regulacion_internacional/info_nacional_internacional/documentos/Consultation%20on%20Developing%20ICT%20Infrastructure%20for%20Smart%20Cities%20in%20Peru_2....pdf

[99] http://diariocorreo.pe/ciudad/cusco-chinchero-se-prepara-para-ser-la-primera-smart-city-del-peru-623943/

# Poland Smart Cities Guide

## SMART CITY OVERVIEW

Smart City projects in Poland are at the much lower level than those in Western European countries and in the United States. US. Barriers are mainly financial, but also a lack of understanding of the concept of "smart city". Only 14% of Polish towns declare implementation of smart solutions, and just 36% of city representatives declared that they are familiar with the "smart city" idea. As the professor of the Warsaw School of Economy and the editor of the site www.InteligentneMiasta.pl, Mr. Andrzej Sobczak says "much depends on the city authorities. Not all city mayors understand the concept of smart city and what are the benefits from the implementation of this concept. Important obstacles in the implementation of these concepts are also finances. The budgets of cities largely absorb fixed costs related to the implementation of statutory obligations."

## KEY INITIATIVES (BY SECTOR)

### SMART TECHNOLOGY

By 2020 all citizens will have access to high-speed broadband of at least 30 Mbps with half of them having broadband access at a speed of at least 100 Mbps. The government intends to support the construction of municipal broadband networks to make the investments more attractive for network operators. The Ministry will support the "Intelligent Development Program" and the "Digital Poland Program" which are consistent with the Smart City initiative and will provide individual citizens and companies with the most modern IT services. Every third local government is interested in smart metering: 37% in remote reading of water meters and 32% in city monitoring.

### SMART MOBILITY

Intelligent transport systems (ITS) are being installed in several Polish cities including Bydgoszcz, Gliwice, Krakow, Szczecin, and Wroclaw. It is estimated that implementation plans should appear in 10–15% of city municipalities by 2020. According to ITS Polska, the value of related investments from 2014–2020 could reach PLN 10 billion.

### SMART GOVERNANCE

The government assumes that 64% of citizens and 95% of entrepreneurs will use the Internet as the basic tool for reaching out to public authorities in 2020; today, it is 32% and 90%, respectively. A central data repository and single point-of-contact platform to enable access to all eServices will make it easier to reach out to authorities.

### SMART ENERGY

The most promising area from an ICT perspective is smart city LED lighting. Initiatives are limited in scope and are mostly related to the management of energy consumption in urban areas.

## CHALLENGES

No specific challenges or market access barriers have been identified.

## FEATURED CITIES AND/OR PROJECTS

**Gdansk:**

- Open Data Policy: sharing with the citizens data collected by the city and the use of new technologies to promote transparent governance.
- EUREKA/IBM Intelligent Operations Center: air quality management system and noise levels.
- Co-organizer Business Intelligence Hackhaton Api (BIHAPI) dedicated to popularization of Application Programming Interfaces (APIs) provided by telecom operator and smart city services based on Open Data Policy.

- Awards: ABSL, ASPIRE, European Outsourcing Association, Best City of the Year, 2013; 6 Baltic Sea Wonders Award, 2012

**Rybnik:**

- GIS based city management system, E-Administration
- Municipal broadband network covering 133 public institutions in the city, Intelligent transportation management system including 167 e-information boards on public transportation stops, information about available parking places
- Electronic city card which operates the following services: public transportation ticket, entrance tickets to city sport facilities, e-purse, city parking, e-signature, Mobile Passenger Information System showing the real position of a bus
- Smart metering system in public buildings, monitoring system for water and wastewater piping system in the city

  *International awards received:*

  - European Public Sector Award EPSA 2013 Best Practice for e-ticket implementation.
  - European Public Sector Award EPSA 2009 Best Practice for GIS implementation.
  - EuroCresst Award 2009 for the city web site.

**Rzeszow:**

- VoIP platform for metropolitan wireless broadband network ResMAN; 132 public buildings, schools and commercial centers within the network, 130 Internet hotspots for citizens, 20 thousand households with free Internet access
- Over 100 schools with free Internet access and computerized management system,
- ITS including public transportation management system, E-ticket, E-info information for public transportation passengers
- In 2014 the city was listed by the Vienna University of Technology as one of the top 100 smartest middle size cities in Europe

**Szczecin:**

- Pilot Advanced Metering Infrastructure
- Fibreoptic network of length exceeding 100km
- 413 municipal hotspots available in more than 150 locations
- Wi-Fi zones located in all public schools and school-educational centers
- Wi-Fi zones available in selected community councils, sport areas and cultural institutions
- Wi-Fi zones available in public forests from April to October: program called “Active and Interactive in public forest”
- E-Government: program “The spatial data system of the city of Szczecin” enables development of public services performed with the use of electronic means
- Intelligent transportation system since 2012
- Central public communication management system based on the San Francisco model; (all public transportation means are to be equipped with GPS transmitter).
- The traffic management System implemented in Szczecin by was awarded the prize for the best implementation of a traffic management system in Poland by the participants to the ITS Congress 2013

**Warsaw:**

- Warsaw eCard Project – eCard for City services f.e. transportation ticket, entrance to museums, cinemas, libraries, gyms
- ePayments for traffic tickets, taxes, and parking fines

- Virtual Warsaw Project – beacons usage to facilitate mobility for the visually impaired – The 2014 Mayors Challenge Winner (Bloomberg Philanthropies)
- GIS maps system with many public services f.e.: Warsaw today, historical maps, ownership, real estates, graveyards with detailed plans, cycle paths etc. with WMS and WFS

## UPCOMING EVENTS CALENDAR

- February 2017: 5th SMART CITY FORUM – Warsaw; http://en.smartcityforum.pl/
  Contact: Ms. Beata Bak – b.bak@mmcpolska.pl
- Polish Regional Congress SMART CITY Principles and Perspectives 2017 – http://successpoint.pl/smart-2017-warszawa
  - March 2017 – Warsaw; April 2017 – Gdansk;
  - June 2017 – Wroclaw; October 2017 – Krakow

  Contact: Ms. Klaudia Moskala – klaudia.moskala@successpoint.pl
- March 2017: Smart Metropolia Congress – Gdansk; http://www.smartmetropolia.pl/
  Contact: Mr. Krzysztof Smiech – Krzysztof.smiech@mtgsa.com.pl

## RESOURCES

Commercial Service: Anna Janczewska: anna.janczewska@trade.gov

# Portugal Smart Cities Guide

## SMART CITY OVERVIEW

Portugal is well positioned in respect to Smart Cities. Portuguese cities currently face various challenges related with overpopulation. Universities, companies and other groups are working closely with municipalities to find scalable solutions for different fields such as energy, mobility, environment, health governance and quality of life. This means the public and private sectors are now sharing information in order to jointly identify solutions to solve a wide range of issues affecting the community. In 2009, a network of Portuguese smart cities by the name of Rener was launched. Today, it includes more than 43 municipalities from all over the country. The Portuguese Smart City Cluster is actively promoting Portugal as a place for the development and production of technology solutions, products and value-added systems for smart cities at global level, as well as promoting the competitiveness, innovation capacity and internationalization of smart city companies.

## KEY INITIATIVES (BY SECTOR)

### SMART MOBILITY

The MOBLE network has more than 1300 normal charging stations and 50 fast charging stations in places of public access throughout Portugal.

Portugal has a number of smart parking solutions designed to provide better cities for living and conveniently and efficiently manage parking payments.

### SMART ENERGY

The Portuguese city of Évora, with a population of 55 thousand and are of 1.307 square kilometers, was the first Iberian Smart City – Évora InovCity – where an automated meter infrastructure was deployed. There are around 32,000 electricity customers with an annual consumption of approximately 273GWh. Around 35,000 smart meters and 340 distribution transformer controller (DTC's) were recently installed.

### SMART SERVICES

- Implementation of video surveillance in public spaces
- Fire prevention sensors and control systems
- Flood control predictive systems and sensors
- Digital access to urban planning documents
- Wi-Fi hotspots in public places
- High-quality of the tourist destined gateways and apps

### SMART GOVERNENCE

- Online access to municipality's expense
- Open Data policy and number of data sets available
- Level of integration of the administrative process and data sharing in back-office
- Digital urban planning
- Existence of online participatory budgeting
- Availableness and quality of relating with citizens gateways
- Level of online contact with the municipal administration
- Online certificate requests

**LISBON, Portugal**

Population Growth, 2013-2014:
**0.0%**

Total Employment, 2014 (Thousands):
**1,449 People**

Real GDP Growth 2013-2014:
**-1.2%**

Employment Growth, 2010-2014:
**-1.4%**

*Brookings Metro*

## CHALLENGES

In order to successfully enhance the adoption of innovations and deploy smart city solutions in Portugal or elsewhere, market barriers such as lack of integrated and coherent public policies, poor urban planning and city management, resistance to change and innovation, lack of demonstration smart city projects, standards and interoperability issues, and lack of funding sources must be addressed.

## FEATURED CITIES AND/OR PROJECTS

**Évora:**

Population: 43.000;
Contact: Mayor Carlos Pinto de Sá

Évora is one of the first Smart Cities with about 31,000 residential customers taking advantage of billing system based on actual consumption (in relation to overall consumers) and also enabling consumer control via a computer of smartphone.

**Lisbon:**

Population: 2.8 million;
Contact: Mayor Fernando Medina

The integrated Lisbon transport system comprises a large amount of transport combination tickets, and several paying options, including web, applications, and ATM. The public transport system has a series of modern public information systems and Lisbon has one of the world's strongest route calculators, Transporlis to integrate all operators.

BIG Smart Cities by Vodafone Power Lab is co-organized with the City of Lisbon. A program with an international competition to accelerate startups where the startups get to pitch investors and earn fantastic prizes to launch and scale their businesses. The city and its sponsor, Vodafone look for technologies that use the Vodafone New Generation Networks to solve challenges in 4 different categories: smart mobility, energy, tourism, living.

**Porto:**

Population: 1.7 million;

Contact: Mayor Rui Moreira

Board any bus in Portugal's second-largest city, and free Wi-Fi is available courtesy of a network of routers affixed to more than 600 municipal vehicles. It's the biggest Wi-Fi-in-motion network in the world.

Desafios Porto is a competition created by the City of Porto in partnership with NOS, EDP, CEIIA and EY, that aims to identify the biggest challenges faced by the city of Porto and to find the tech solutions that give the most innovative and scalable answers. The Future Cities Project is an FP7 funded project intended to expand the Center of Competence for Future Cities of the University of Porto (Future Cities UP).

**Other**

FI-WARE accelerator is a project funded by the European Commission aims to grow innovative web-based solutions for smarter urban life of Europe's citizens.

## UPCOMING EVENTS CALENDAR

- May 18-19, 2016: Zoom Smart Cities – http://www.zoomsmartcities.com/en/
- March, 2017: Green Business Week - http://greenbusinessweek.fil.pt

## KEY ORGANIZATIONS

- Inteli - http://www.inteli.pt
- InovCity - http://www.inovcity.com/en
- APDC – Portuguese Association for the Development of Communications; http://www.apdc.pt

## RESOURCES

Commercial Service: Pedro Ferreira – pedro.ferreira@trade.gov

# Romania Smart Cities Guide

## SMART CITY OVERVIEW

"Smart City" is still a fairly new concept in Romania. Initiatives are primarily supported by private or international/EU funds or programs. The government has begun to support the development of smart city infrastructures, primarily through pilot projects; however, lack of financing and a lack of understanding continue to be barriers to development. Romania is still searching for the right solutions, both in terms of the legal framework and implementation. A 2014 energy efficiency law places great importance on involving local authorities, requiring them to identify relevant investment projects. Cities and towns with 20,000 or more inhabitants have specific obligations regarding energy management.

## KEY INITIATIVES (BY SECTOR)

### SMART MOBILITY

Eight cities have developed sustainable urban mobility plans: Brasov, Bucharest, Cluj-Napoca, Constanta, Craiova, Iasi, Ploesti and Timisoara. Elements of public transport management systems, such as surveillance cameras, e-ticketing, and SMS parking payments can be found in a number of cities. The country relies on an inter-ministerial committee, with representatives from the ministries of transport, ICT, education, economy, finance and environment, along with trade associations, to develop and approve national projects.

### SMART TECHNOLOGY

Romania, with peak speeds nearing 60 mbps, has the fastest Internet in Europe and the 6th fastest in the world. However, its fixed broadband penetration is still the lowest in the EU. Romania launched the Ro-Net broadband project in January 2015 to expand coverage of the national broadband infrastructure to disadvantaged areas. At completion, the new network will reach nearly 5000 km and over 99% coverage. Extensive 4G networks cover most of Romania

### SMART ENERGY

Romania adopted the EU target of smart meters installed for 80% of consumers, but has extended the implementation date by a year to 2021 to allow for more time for a cost-benefit analysis. The government is currently in the second phase for 2016 pilot projects. Eighteen smart meter pilot projects will be implemented and assessed by Q1 2017. A National Investment Program in Smart Metering, based on these projects, is expected to be approved by April 2017.

The Romanian power grid is only 30% efficient and equipped with outdated installations. Conditional on EU funding and the State budget, certain public universities may develop and operate "micro smart grids. A feasibility study for one such project, supported with a USTDA grant, is underway at Politecnica Bucharest University.

### SMART HEALTH

National Health Insurance ID cards with chips became mandatory for all visits to doctors, hospitals and pharmacies in 2015 to reduce red tape and corruption in the medical sector. At the end of 2015, the Ministry of Health implemented a rural telemedicine project in three counties, with plans to later deploy it nationally.

## CHALLENGES

While there are no market access barriers, there is still a lack of public financing for smart city projects and a lack of coordinated efforts to access EU Funds.

## FEATURED CITIES AND/OR PROJECTS

**Bucharest:**

City Hall is the largest user of the EmerGIS solution for the national 112 call center, which handles over 1.4 million calls per month. Bucharest's traffic management system includes features such as CCTV and Urban Traffic Control, with 140 equipped junctions monitored by a central command center.

**Cluj-Napoca:**

Cluj Innovation City is implementing its "Brained City" project to integrate medical network, e-business, e- government, and urban traffic management solutions to develop smart buildings and smart housing on a hosted cloud structure and achieve a harmonious urban ecosystem.

**Brasov:**

Brasov has an intelligent street lighting management system, allowing for reduced energy consumption and lower carbon dioxide emissions, and increased citizen safety including CCTV and panic buttons. The Romanian Emergency Rescue Service has a pilot project for Emergency Vehicle Preemption in Targu Mures to allow first responders to reach emergency scenes more quickly and safely with global positioning technology and radio communications.

**Albaiulia:**

Alba Iulia is the first city in Romania with a mid- and long-term development strategy drafted with the World Bank. The city has been successful at accessing EU funds and will develop the first "mobile-based e-democracy platform" in Eastern Europe. The buildings, statues and schools will "talk" to the people and the residents of Alba Iulia will be "heard in all aspects of the city management process". The city's Smart Mobility Plan is under development, expected to be complete in July 2016.

## UPCOMING EVENTS CALENDAR

- September 29-30, 2016: Smart Cities of Romania – Oltenia edition, Craiova University, Craiova
- October 2016: Romanian Energy Efficiency Forum 2016 (TBC) – Bucharest; www.govnet.ro/Romanian-Energy-Efficiency-Forum-2015
- November 22-23, 2016: Smart Cities of Romania 2016, University Politehnica Bucharest, Bucharest; www.romaniasmartcities.ro/en

## LINKS

- WEC Central & Eastern Europe Regional Energy Forum, FOREN, 13th Edition - www.cnr-cme.ro
- Intelligent Transport Systems (ITS) Romania - www.its-romania.ro
- Ministry of Communications and for Information Society - www.mcsi.ro
- Ministry of Health - www.ms.ro
- National Energy Regulatory Agency (ANRE) - www.anre.ro
- Romanian Association for Security Techniques (ARTS) - www.arts.org.ro
- World Energy Council—Romanian National Committee - www.cnr-cme.ro

## RESOURCES

Commercial Service: Mihaela Dodoiu – mihaela.dodoiu@trade.gov

# Rwanda Smart Cities Guide

## SMART CITY OVERVIEW

Kigali is trying to portray itself as Smart City Kigali. In support of this, several initiatives are underway, including: the Kigali Innovation City, 4G on public buses, a pilot program for a cashless bus fare system, identification of a possible site for the Center for Data Sciences, and the hosting of the Smart Africa Secretariat.

## KEY INITIATIVES (BY SECTOR)

The Government of Rwanda (GOR) has prioritized building infrastructure to transform Rwanda into a service economy. The GOR through the Rwanda Development Board (RBD) is focusing on how to leverage the infrastructure they have built to drive the service industry. To this end, RBD is currently focusing on these five key pillars:

1. **eGovernment/ Command Centre:** the Prime Minister and Presidential Offices created a central dashboard to track progress towards the Vision 2020 goals, and they are now using this architecture to measure completion of the targets.
2. **Rwanda Online:** RDB is focusing on promoting PPPs to digitize 100 service delivery areas using an integrated platform. The first nine services areas will be implemented by July 2016.
3. **Skills Development:** RDB is working to set-up training and incentive systems to attract and maintain civil service employees. This initiative has grown to now also leverage training and certification in key areas with the private sector as well.
4. **Cybersecurity:** RDB is now very focused on security to protect key data and systems. Given the high level of physical security Rwanda holds in the region, RDB is also looking to make Rwanda a hub for cybersecurity as well, to encourage greater data hosting and investment as a hub for the region.
5. **ICT SME Incubators:** RDB is planning a technology park in partnership with Carnegie Mellon University, which will be the anchor tenant for the development. They have earmarked land in a Special Economic Zone (SEZ), and they have secured funding from the Asian Development Bank (ADB) to finance the campus. The GOR has also committed funds to develop the key infrastructure (utilities, access roads, power) and is looking for additional partners and investors.

# Serbia Smart Cities Guide

## SMART CITY OVERVIEW

Serbia does not have an official Smart City policy. High financial costs and lack of knowledge are the main problems for not cultivating and implementing Smart City projects. Smart City is a new concept, as well as how it can contribute to their economic development. The only cities that have "Smart City" characteristics are Belgrade and Novi Sad, but it is on an ad hoc basis and not a formal Smart City strategy. There have been several conferences on the topic of Smart Cities. The most significant was the Fourth Summit of Serbian Energy Managers—Sustainable Energy in Local Communities, organized by Central European Forum Development, CEDEF. CS Belgrade is planning to organize Smart City Forum and help decision makers to understand importance of introducing Smart City technologies. Potential partners supporting this initiative may include: IDC, IBM, Cisco, Microsoft, City of Belgrade and Serbian Ministry of Telecommunications and the U.S. Green Building Council.

## KEY INITIATIVES (BY SECTOR)

### SMART TECHNOLOGY

- Wi-Fi was recently introduced in public transportation systems in Belgrade. However, the connection is slow and not all vehicles are equipped with free wireless networks Belgrade plans to improve this by the end of 2016.
- Air Serbia, the national airline of Serbia has rolled out wireless Internet access on its fleet.
- Public transportation systems in Belgrade are using systems that provide users with information such as estimated arrival times to bus stops using GPS systems installed on each bus. This could be in demand throughout Serbian public transportation. The City of Pancevo's "Bus-Tracker" provides a superior solution that shows the exact location of the desired bus in public traffic, and the time of arrival of the next vehicle. Belgrade's system can be the first step and Bus-Tracker can be implemented when citizens get familiar with the application. Belgrade and Novi Sad both provide the option of paying parking services via SMS.

### SMART ENVIRONMENT

The "Eco-Bus" service provides information about air quality, temperature or humidity in real time on an interactive map on mobile phones or websites. It is currently available only in Pancevo. However, only people who use the car parks under the control of Pancevo's "Parking Service" can use this service.

### SMART ENERGY

A group of students from the Faculty of Electrical Engineering in Belgrade developed the world's first public solar charger for mobile phones, which won first place in the European Commission's "Sustainable Energy Week 2011" competition in Brussels. Strawberry Tree is a solar and Wi-Fi station which is permanently installed in public places such as streets, parks and squares, providing passersby with the opportunity to charge their mobile devices for free when they are outside. It can be found at several locations all around Belgrade, Vranje, Bor, Valjevo, Obrenovac, Kikinda and Novi Sad. Besides those Serbian cities, City of Timisoara, Romania, and City of Bjeljina, Bosnia and Herzegovina, also have this product.

The Smart Metering & Energy Efficiency program is locally developed by E-Smart Systems company. Their goal was to develop a complex, scalable and reliable AMM system that would be offered to the market after a few months of Program initialization, it started with the development of smaller and simpler AMR system - MESMET One system.

## SMART SECURITY

The majority of Serbian elementary and high schools are fitted with cameras. Some police stations in Belgrade have control rooms where police officers are able to watch live streaming from the schools located in their municipalities. The Government plans to create control rooms for each municipality in Belgrade.

## SMART GOVERNANCE

Some municipalities are offering the appointments and document requests from government institutions through an online portal. Indjija is technologically the most advanced municipality in Serbia. The Citizen Assistance Center is an integrated part of Indjija's municipal administration designed to provide easy access to the most important municipal services. It is the first of its kind in Serbia. Authorities are publishing online a lot of general information, thus making easy access for people to find information they need.

Besides official web pages, many Government institutions are using social media. They are targeting younger population and informing them on their work.

Belgrade communal service, Beokom, has launched new application aimed to help citizens to easily report every problem they notice in the city. Every call is registered and then it is up to Beokom to coordinate solving of each reported problem.

## CHALLENGES

No specific challenges or market access barriers have been identified. Due to the lack of funding, most initiatives are carried out through Horizon 2020 project.

## UPCOMING EVENTS CALENDAR

October 2016: Smart City Forum

## RESOURCES

Commercial Service: Zorica Mihajlovic – zorica.mihajlovic@trade.gov

# Slovakia Smart Cities Guide

## SMART CITY OVERVIEW

The idea of Smart Cities in Slovakia has not yet developed. There is currently just one private initiative grouping open-minded private companies in Trencín. On the other hand there are some possibilities to obtain support funds related to smart solutions from state institutions. Smart Cities in Slovakia is not viewed in holistically, initiatives are not connected and are mostly fragmented. Funds are available at the state level, promoting ecological and sustainable solutions, but these are not part of wider programs for smart cities.

## KEY INITIATIVES (BY SECTOR)

### SMART TECHNOLOGY

As stated above, Slovakia lacks on smart solutions. Although in Slovakia, particularly in bigger cities like Bratislava free public Wi-Fi is available. This could be the base for connecting smart technologies in the future.

### SMART ENERGY

The most commonly used Smart Energy solution in the Slovak cities is LED technology installed on streets. The most innovative city related to LED technology is Senec, where the local municipality was addressed by private company ECO-LOGIC with the project of modernization of public lighting. Several smaller cities and villages also decided to follow the example of Senec.

The Western-Slovakia Energy Company (Západoslovenská energetická spoločnosť) offers funds Live Energy (Živá energia) through Ekopolis foundation with aim to increase the energy efficiency of buildings.

In terms of water energy, The Eastern-Slovakia Water Company (Východoslovenská vodárenská spoločnosť) has launched so-called real time readings of water consumption in order to from manual readings and water leaks.

Finally, Smart Metering has been launched by Western-Slovakia Distribution Company (Západoslovenská distribučná) in August of 2014. The company replaces analog electrometers with smart electrometers in order to collect, transfer and process real consumption data. This is to supply exact amount of electricity in peak times to keep absolutely constant voltage and frequency and eliminate loses caused by oversupplying energy to the grid network. Customers are divided into four categories based on their annual consumption of electricity. The whole system should be fully implemented by the end of the year 2020.

### SMART BUILDINGS

The energy efficiency of buildings is one of the main priorities for the Slovak Government. There are 1,8 million inhabited units in 880,000 apartment buildings in Slovakia. About one third of buildings, which were built before the year 1992, had been reconstructed and insulated by year 2012. About 66% of Slovak population lives in old panel houses, which were built during the communist era. Buildings consumes about 44% of Slovakia energy needs.

Regarding the energy intensity, Slovakia belongs to the most ineffective countries among the EU member states with more than double consumption of energy in comparison to the EU average consumption. The main aim of the government is not only to promote to build new effective buildings due to energy certificate ratings, but also to promote reconstruction of existing buildings. This is being done through State Housing Development Fund (Štátny fond rozvoja bývania) which helps to finance reconstructions of apartment buildings, mostly panel houses in order to increase energy efficiency of existing old buildings.

## SMART/ALTERNATIVE MOBILITY

Slovak cities did not develop any alternative mobility related to car sharing, bike sharing or cycling routes. On the other hand the Slovak government financed construction several electric charging stations in bigger cities that offer free electricity for owners of electric cars.

Smart thinking is becoming popular also within the private sector. The most active company that rents electric vehicles and builds and operates charging stations for electric vehicles is privately owned company GreenWay. The company has recorded 80% increase of customers annually. According to the CEO of GreenWay, Mr. Rastislav Lauko, there is a huge potential for electric cars in Slovakia. There should be 50,000 electric car users in Slovakia according to his estimations by the end of year 2025.

The Slovak government also supports ecological solutions in public transport thanks to EU funds obtained through the Operational Transport Program (OPD – Opera-ný program doprava) and state and municipal co-financing. This included the purchase of new trams and trolleybuses in two of Slovakia's biggest cities, Bratislava and Kosice. For example Bratislava bought 60 new trams in total amount EUR 152,100,000 and 120 trolleybuses in total amount over EUR 73 million.

## CHALLENGES

No specific challenges or market access barriers have been identified.

## FEATURED CITIES AND/OR PROJECTS

**Bratislava:**

The capital city of Slovakia is part of Smart Cities thanks to its Smart Environment policy. The municipality revealed its plans to propose and create new green places in the city with the aim to fight against climate changes. This initiative is known as Bratislava, zelenaj sa" (Bratislava Goes Green). The project itself consists of three pillars:

1. Amenity planting (alongside roads)
2. Designing and creating new parks
3. Revitalization of existing greenery and water components
4. Realization of ecological roofs.

Bratislava management offered to its inhabitants to participate and comment creation of the city budget in past. Former leftist Mayor also launched mandatory public presentation of all development projects. Bratislava still lacks on Smart Transportation solutions. The city had already several attempts to launch bike sharing or car sharing, but this plans never left the negotiating table. After several fails of local municipality, local activists called White Bikes created their own system of bike sharing.

**Trenčín:**

It is the only city in the Slovakia that successfully implemented the real Smart City solutions and the only city that has created its own vision related to smart solutions. The city publically addressed general requirements and conditions and the municipality of Trenčín chosen the most suitable project at the end of the selection process. The smart city project for Trenčín that will be completely done by the end of June 2016 was prepared and implemented in cooperation with four companies – Slovak Telekom, Cisco, Kiwi Security and French company Cofely GDF Suez. It is the pilot project in Slovakia which corresponds with the real definition of Smart City. These four companies financed the whole activity and the municipality offered its parcels free to these companies. This investment consists of a brand new Smart City Street in Trenčín, where implemented technologies like Smart Lights (LED lights), Smart parking, Smart Transport Management, Protection and Security are connected by Smart Wi-Fi.

**Prešov:**

Although the city has not been viewed as Smart City by the EU standards, the municipality of

Prešov launched OpenData Catalogue, with the aim to make public procurement more transparent. This enables citizens and entrepreneurs to be well informed about public projects.

## SOURCES

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# South Africa Smart Cities Guide

## SMART CITY OVERVIEW

Smart cities are no longer a preference—they are quickly becoming a critical necessity in South Africa. This is due to the confluence of increasing urbanization, greater pressure being placed on the successful management of South African cities due to a rising population, and climate change. Each city needs to have the innovative capacity to manage a sudden natural crisis, such as flooding, and be able to dispatch emergency and medical units without delay to save lives. The digitization of IT is further forcing cities to adapt, and, like most businesses, have a digital strategy in place.

International Data Corporation (IDC) notes that South Africa is the leader when it comes to smart city technology in Africa. South African cities recognize that the benefits of smart cities are wide ranging, affecting a broad spectrum of industries and making life easier for residents in a multitude of ways. South African cities: *Johannesburg, Cape Town* and *Durban* are taking the lead with various smart city initiatives and have put into operation some variants of smart city solutions.

For cities that implement the 'smart' part correctly and are well managed, the benefits of living in a smart city are plentiful. For governments it means that cities not only can be better monitored and looked after, but also be greatly improved. Furthermore, through e-government initiatives, cities would be able to improve governmental processes to its stakeholders, including businesses and citizens. This includes many online services which could cut down on process cost and time. Locally, service delivery stands to benefit significantly from having effective systems and processes in place. The implementation of the City of Johannesburg's "load-limiting" smart meter is one such instance, enabling the power utility to better monitor and manage electricity supply. During periods where the electricity grid is under pressure, households will be alerted to turn off high-consumption appliances to avoid full power cuts.

The country of South Africa understands the need for smart cities and the benefits of their initiatives and looks to work toward countrywide improvements. Quality of life expectations and implementation of best practices across different industries is a fervent goal that pushes for private and public sector cooperation. Groups like the South African Local Government Association (SALGA) promote innovation in local government. SALGA encourages a mindset of innovation in municipalities. This means innovating around issues and problems that communities face and thinking about local government in a different way. SALGA's role is to collect and disseminate knowledge on innovation, to encourage learning, and to facilitate the replication of successful practices in different municipalities. Innovation creates connections among communities, government, the private sector and civil society seeking innovative ways to meet social needs. The SALGA captures the essence of South Africa's countrywide effort.

## KEY INITIATIVES (BY SECTOR)

### SMART ENERGY

South Africa is in the midst of an energy crisis that is resulting in rising energy prices, rolling blackouts (known as load shedding in South Africa) and changing energy policies and incentives. As a result, end users have begun exploring alternative means to ensure their energy security, leading to the rise of the energy services market. This market comprises energy efficiency and embedded generation services. These two types of energy services, efficiency and generation, share a similar market space, having been driven to grow by similar circumstances and are affected by very similar changes in policy and regulations.

Renewable energy (RE) has gained momentum, with a significant rise in the uptake of various RE technologies such as: solar photovoltaics

(PV), wind energy, biogas and other biofuels, hydroelectricity, landfill gas, geothermal energy and concentrated solar power (CSP). Government policy support and procurement programs, sustainability concerns, reducing RE technology costs, increasing need for energy security and increasing conventional electricity prices are key drivers of this shift, especially in the South African context.

## SMART WATER AND SANITATION

Water demand is increasing at a higher rate than population growth, as income levels of towns rise and demands for food and services increase. Water availability, on the other hand, is declining due to competing demands from agriculture and industry, and from deteriorating water quality and climate change. This rising demand and diminishing supply will require careful management of the province's water resources, and carefully placed investments.

The waste industry in South Africa currently consists mainly of collection and landfilling, with a limited amount (10%) of recycling. Household waste is managed by municipalities (and/or their service providers) and commercial and industrial waste is typically managed by the private sector (in larger municipalities), although some waste may still be disposed of at municipal landfills.

## SMART TRANSPORTATION

- The Cape Town Integrated Rapid Transit System introduced in 2011 for the launch of MyCiTI services, which comply with Euro 4 emissions standards. Smaller buses introduced in December 2012 comply with the even stricter Euro 5 emissions standards.
- The City of Johannesburg has a similar system called the REA VAYA which offers fast, safe and affordable public transport on a network of bus routes across Johannesburg.
- Durban has initiated GO!Durban which is eThekwini's very own Integrated Rapid Public Transport Network. This project will provide a sustainable, integrated transport system for the people of Durban. GO!Durban's objective is to implement a world-class network of rail, road and non-motorized transport systems that provide commuters with efficient and economical public transport options.

## SMART INFORMATION AND COMMUNICATIONS

The Smart Cape Access Project (Smart Cape) is an initiative of the City of Cape Town's Directorate of Information Technology to provide free computer access and Internet connectivity to the citizens of Cape Town. The pilot program provides access points located in six city libraries and uses open source software and the city's existing infrastructure and resources to minimize costs. Access is provided free of charge on a time-limited basis to registered users, who must be library members. Each access point has six Internet-enabled computers, five for public access and one for administration and library staff. The access points are regarded as an extension of the libraries' existing role as information providers.

The pilot project is an offshoot of the Smart City Initiative, a technology integration and upgrade project that aims to:

- Promote efficient e-government service delivery;
- Narrow the digital divide;
- Empower citizens in the knowledge economy; and
- Promote effective citizen involvement in e-governance.

Smart cities are being recognized by prominent African leaders and they are calling on their countries public sector to take action. An example is that of Trevor Manual (South African Minister in the Presidency) who openly spoke out at South Africa's GovTechnology Conference in November 2013 stating that "… the (SA) constitution doesn't give us an option: it says we must improve the quality of life of each person and free the potential of each person. It doesn't say we can leave people behind. We recognize that IT, the great enabler, can help us release the potential of each person. We can push the boundaries of enablement through IT."

## SMART BUILDING MATERIALS

The Green Building Council of SA overseas building materials (www.gbcsa) however there are no specific "smart city building materials initiatives."

## CHALLENGES

A number of challenges still stand in the way of smart cities becoming a reality in South Africa, including an underdeveloped infrastructure and appropriate skills development. This is a particularly vexing hindrance to the advancement of smart cities nationally, requiring well-trained, tech-savvy individuals who understand and can use IT systems when under pressure. Unfortunately, this development of human capital does not happen overnight.

## FEATURED CITIES AND/OR PROJECTS

**Durban:**

Durban has won the IBM Smarter City Challenge. This will have IBM experts working with the City's leadership to develop a roadmap to a smart city which is aligned to the economic development and job creation plan for the City.

**Cape Town:**

Cape Town is one of the world's leading "smart cities". "What the City of Cape Town has going for it is that it has a very committed energy and climate change team working hard… to try and drive change, and they're working with the Transport Department and other departments to try and integrate this topic of energy efficiency and renewable energy into the services that they deliver. So from that perspective, they are putting in a lot of effort."- SA National Energy Development Institute (Sanedi) chief executive Kadri Nassiep

**Johannesburg:**

There are five smart city projects at the moment:

1. The 1100 km fiber network and associated Wi-Fi hotspots (408 of a planned 1000 are active)
2. The digital ambassadors program and linked Maru a Jozi cloud based citizen engagement platform
3. The new e-health clinic system
4. The integrated intelligent operations center (currently integrating and analyzing city data and other inputs to guide deployment - inspired by both Rio and New York examples)
5. The Massive Open Online Varsity, or MOOV, will provide the kind of learning gateway that will roll out online university education in partnership with international institutions through the city's public libraries

## UPCOMING EVENTS CALENDAR

- July 26-28, 2016: Green Building Convention 2016
- October 2016: Smart Cities Africa – Johannesburg
- November 15-17, 2016: AfriCom 2016 – Cape Town

# Spain Smart Cities Guide

## SMART CITY OVERVIEW

Spain has a national plan for intelligent cities, promoted by the Ministry of Industry, Energy and Tourism. The plan invests 153 million Euros in smart cities development, coordinates efforts between cities, improves communication and offers recommendations for short and long term development in all smart city sub-sectors. In Spain, more than 80% of the population lives in urban areas, and that number is only growing. Along with the United Kingdom and Italy, Spain has the most smart cities in the European Union. About 30% of all smart city initiatives are focused on mobility, and 20% on sustainability, with 10% of smart cities implementing multidimensional plans to address all aspects of society and living. Smart cities are also vital for tourism in Spain, and will play a huge part in the growth of the industry. Spain has many entities working both domestically and internationally to establish and improve intelligent urban systems.

## KEY INITIATIVES (BY SECTOR)

### SMART ENERGY

Spain encourages the use of alternative energy nationally and in smart cities. It was the first country to get the plurality of its energy from wind power and continues to invest in such technology. Cities like Valladolid are becoming testing grounds for building renovation and renewable energy systems in efforts to cut CO2 emissions by 80%. Air quality is Spain has historically been subpar, but recently cities like Madrid have introduced radical pollution reducing measures, including a 6% reduction in traffic by 2020.

### SMART MOBILITY

The national strategy of electric vehicle promotion focuses on developing the infrastructure, market and industrialization of electric vehicles in Spain. The AVE high-speed rail system is one of the most advanced in the world. It revolutionized how people travel between smart cities in Spain, with many new connections being planned. Intelligent traffic and public transportation systems are rapidly becoming the norm in Spain. Many cities have smart traffic lights, bus tracking apps, and bicycle sharing programs. Mallorca is installing electric car charging stations to make the whole island accessible by electric vehicles, which will also be available to rent. Madrid has already implemented affordable public electric bike and cars rental service available in most areas of Madrid capital city.

**BARCELONA, Spain**

Population Growth, 2013-2014:
**0.0%**

Total Employment, 2014 (Thousands):
**1,980 People**

Real GDP Growth 2013-2014:
**-0.004%**

Employment Growth, 2010-2014:
**-2.1%**

*Brookings Metro*

### SMART GOVERNANCE

Spain has a one-stop website for all general citizen services, including getting a visa, vaccine appointments, and public employment opportunities. The Center of Economics and Finance Information makes budgets, pensions, taxes and other government transfers accessible to all citizens. The Commission for the Reform of Public Administration and the central data entry portal (FACe) facilitate public-private interaction and mandate digital invoicing.

## FEATURED CITIES AND/OR PROJECTS

**Santander:**

- Over 12,000 sensors have been installed throughout the city, to measure and monitor everything including available parking spots, soil dampness to prevent overuse of sprinklers the amount of trash in dumpsters. The system

also provides automated dimming of street lamps on empty streets and during a full moon and automatic ordering of new streetlight bulbs.

- The city has also created applications that allow citizens to report potholes and other public nuisances.
- On several occasions, Santander has collaborated with corporations including Telefónica, IBM, NEC, Ericsson, and Alcatel-Lucent.

**Málaga:**

- Since 2009, a 25% electricity consumption decrease as part of an eco-city initiative supported by Endesa.
- Testing grounds for new smart grid tech.
- Ubiquitous electric vehicle charging stations and cooperation with electric vehicle manufacturers.

**Barcelona:**

- Plans to roll-out Wi-Fi on all public buses and over 1,520 public hotspots, including parks and schools.
- Online open government initiative including a citizen participation service for discussing ideas and problems, proposing solutions and voting on other citizen proposals.
- 22@, the central business district, facilitates the use of public spaces in the city of Barcelona to carry out tests and pilot programs on products and services with an urban impact, essentially aims to use "city as an urban laboratory".
- Host of the world-renown Smart City Expo and Mobile World Congress.

**Madrid:**

- Madrid Smart Lab calls for innovative solutions for actual city problems, to be submitted by private firms and individuals, with the top suggestions being implemented.
- A renewal of the entire street lighting system with LED, energy efficient lightbulbs, saving 44% of city energy consumption.
- Partnership with IBM for the Madrid iNTteligent platform, with data streaming in from sensors, devices, cameras, inspectors and other suppliers as well as data from human resource management, job scheduling and geographic information system.

**Valencia:**

In 2014, Valencia launched the Valencia Smart City Platform (VLCi Platform) which enables the city to centralize information on the cloud on municipal services, based on the European Fi-Ware standard. The platform compiles key indicators of city management and urban services based on 350 indicators that monitor and integrate data on municipal services such as traffic; street lighting, gardens, local police, levels of pollution, waste collection and weather, with the objective of facilitating resident's access to information and optimization of municipal services.

**La Coruña:**

- A new water management system will monitor municipal water use and quality of drinkable water, saving water and energy, while ensuring quality.
- The Open Data Portal releases a wide variety of local and regional datasets to the public. A variety of municipal apps, including guided tours and an all-in-one activities calendar.

These were made possible with collaboration between municipal administration and the Spanish Ministry of Economy and Competitiveness. The program is 80% financed by the European Regional Development Fund (ERDF) through the Operative R+D+I Program.

## CHALLENGES

No specific challenges or market access barriers have been identified.

## UPCOMING EVENTS CALENDAR

- October 25-27, 2016: IoT Solutions World Congress – Barcelona; http://www.iotsworldcongress.com/
- November 15-17, 2016: European Utility Week – Barcelona; http://www.european-utility-week.com/
- November 15-17, 2016: Smart Cities World Expo – Barcelona; http://www.smartcityexpo.com/

## LINKS

- Santander: www.smartsantander.eu
- Málaga: www.malaga.es
- Barcelona: http://smartcity.bcn.cat/en
- Madrid: www.madrid.es/portal/site/munimadrid
- Valencia: www.valencia.es
- A Coruña: www.smart.coruna.es
- Spanish Ministry of Industry, Energy and Tourism: http://www.agendadigital.gob.es/
- Spanish Network of Smart Cities: http://www.redciudadesinteligentes.es/
- National Federation of Electrical Installations and Telecommunications: http://www.fenie.es/
- Association of Electronics, Information and Communications Technologies, Telecommunications and Digital Content Companies: http://ametic.es/en
- USCS Contacts in Spain: www.export.gov/Spain

## RESOURCES

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# Sweden Smart Cities Guide

## SMART CITY OVERVIEW

Sweden is one of the global leaders in several areas of the smart city development. Multiple national and municipal projects are in place across the country, and there are several government funded R&D programs related to the different aspects of sustainable urban development. Stockholm's Vision 2040 is a prime example of a long-term commitment to provide smart socioeconomic urban solutions in Sweden. The government has a clear strategy to be at the forefront of smart urban development and has implemented several projects in collaboration with the private sector and academia, to introduce integrated environmental IoT solutions. Some of the challenges with smart urban strategies include economic concerns, coordination between different stakeholders and cyber security concerns.

## KEY INITIATIVES (BY SECTOR)

### SMART ENERGY

Some 52% of the energy in Sweden comes from renewable sources (Waste to Energy or WtE, bioenergy and hydropower), which means that the country has already exceeded its 2020 EU goal. Furthermore, Sweden is aiming to be climate neutral by 2050. Swedish utilities were among the first in Europe to complete AMR installation and there are several smart grid and micro grid projects in place, demonstrating distributed renewables and self-healing grids. The Swedish Smart Grid Forum, consisting of public and private sector actors and government agencies, has put together a National Smart Grid Action Plan for 2015-2030, that outlines the necessary political framework, market conditions, societal aspects and technology innovation for the country.

### SMART MOBILITY

Sweden's goal is to have a fossil neutral vehicle fleet by 2030, the number of electrical vehicles and charging stations is steadily growing. The Government is investing $ 47 million on electric busses and vehicles in form of environmental vehicle subsidies and large-scale pilots, one such example is the ElectriCity project in Gothenburg (www.goteborgelectricity.se) which is testing electric road/wireless highway tracks, to enable wider use of electric vehicles beyond urban charging points. Also in Gothenburg, Volvo will be launching the first ever large-scale pilot on autonomous vehicles called 'Drive Me' in 2017, with 100 Volvo XC90 models equipped with the IntelliSafe Autopilot.

### SMART INDUSTRY

In 2016, the Swedish Ministry of Enterprise and Innovation launched a strategy for New Industrialization that is connected, more automated and knowledge-intensive with four focus areas:

- Make Swedish companies the leaders of digital transformation;
- Increase competitiveness and value of the sector by sustainable production;
- Boost the industrial skills system and
- Make Sweden a testbed for industrial production R&D.

The government appointed advisory board will be monitoring the implementation of the strategy and making recommendations in regards to laws and regulations, investments in business, education and research, public procurement, testbeds and open data.

### SMART GOVERNANCE

According to the Swedish E-identification Board, a majority of the 9 million inhabitants in Sweden

have an e-id, and over 1.1 billion transactions were made in private and public e-services during 2015. Most of the Swedish municipalities offer e-services and over 50% offer mobile apps, ranging from public maintenance to parking and school catering information. Over 70% of Swedish municipalities offer digital tools for citizen involvement and dialogue either through specific ICT solutions or social media.

eGovlab is the Swedish Center of Excellence for e-governance testbeds. It is managed by the Stockholm University and the Swedish Innovation Agency, Vinnova, and promotes inclusive, transparent and efficient governance and management.

### SMART HEALTHCARE

Swedish e-health strategy aims to ensure efficient information supply in health and social care, including national information structure and interdisciplinary terminology. Over 90% of the prescriptions issued in Sweden today are electronic. The Swedish eHealth Agency is responsible for developing the integrating infrastructure between the different stakeholders and personal health accounts for citizens http://www.ehalsomyndigheten.se. In late 2015, the national Patient Summary 2.0 was launched nationwide, providing an improved digital platform for critical patient information.

### SMART INFRASTRUCTURE

- Congestion charges (taxes) have been introduced in several Swedish cities to improve the traffic flow. In Stockholm statistics show reduced traffic by 20% through this service that utilizes both e-services and mobile apps.
- There are several university projects analyzing GIS and Big Data to study infrastructural challenges and suggest improvements in areas such as inefficiencies in logistics, utility services and transportation.
- Stockholm is investing $ 640 million on 48 modern C30 UTO subway trains. The trains will be delivered starting 2017 and expect to commence driverless operation in 2021.

  Smart, innovative bus stops, equipped with solar charge stations for both vehicles and mobile devices and touch screens for traffic and general information are becoming more common.
- Sweden has 100% broadband and 4G penetration and is a popular location for data centers. Facebook is building their second data center in northern Sweden, and the first climate-positive data center in the world is currently under construction near Falun.

## FEATURED CITIES AND/OR PROJECTS

**Gothenburg:**

- Low speed electric vehicles combined with specially designed trailers are used to distribute goods and collect sorted waste fractions.
- A joint goods transportation and delivery for the city shops.
- Free Wi-Fi on public busses.
- Pilot project city for autonomous driving with 100 cars in 2017.

**Eskilstuna:**

- Eight ABB quick charge stations for electrical vehicles available in the city.
- The public sector plans to have 60% of their electricity from renewable sources, such as PV and wind, by 2020.
- Microgeneration packages are available for the clients of the local utility company for heat and electricity, mainly from solar and wind.
- Infrastructure project "Spaden" encourages citizen interaction in city planning, including innovative storm water solutions and greeneries.

**Stockholm:**

- Stockholm "Vision 2040": a long-term plan to make the city socioeconomically, ecologically and democratically sustainable and safe for everybody.

- Royal Seaport, with 12,000 homes and 35,000 workspaces, is a prime example of modern urban development. This former brownfield that will be complete and fossil neutral by 2030, showcases the latest energy and infrastructure technologies with smart grids, high performing buildings and resident prosumers. http://djurgardsstaden.se/.
- Stockholm has a world-class IT infrastructure and invests a great deal in digital services; Kista Science City, Europe's leading ICT cluster, has made Stockholm an international center of wireless technology, broadband and mobile applications and services.
- Stockholm.se portal aims to provide an increasing number of e-services to make the life easier for the citizens.

## CHALLENGES

No specific challenges or market access barriers have been identified.

## UPCOMING EVENTS CALENDAR

- October 18-19 2016: World Green Building Congress – Stockholm; http://buildingsustainability16.com/

## LINKS

Vinnova—Swedish Innovation Agency, http://www.vinnova.se

The Swedish Energy Agency, http://www.energimyndigheten.se

Sweden Green Building Council, http://www.sgbc.se

"Smart Grid Gotland", http://www.smartgridgotland.se

Power Circle— Electric power business interest organization, http://www.powercircle.org

eGovlab, http://www.egovlab.eu

Royal Seaport Urban Development Project, http://www.stockholmroyalseaport.com

## RESOURCES

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# Taiwan Smart City Guide

## SMART CITY OVERVIEW

Taiwan is well established in the international community as being at the forefront of deploying Smart technologies. In fact, five Taiwanese cities have managed to gain recognition from the Intelligent Community Forum in the last decade, each being entered as one of the top 7 Intelligent Community of the Year. Moreover, the cities of Taipei and Taichung have each been awarded the Intelligent Community of the year in 2006 and 2013 respectively. Other cities recognized were: New Taipei City, Kaohsiung City, Taoyuan City, Taitung County and Hsinchu County. These cities have been recognized for implementing smart practices in transportation, education, energy, government, buildings, and smart citizens.

## KEY INITIATIVES (BY SECTOR)

### FINTECH

The financial technology (fintech) phenomenon has swept through Asia and has reached Taiwan. The island's key technological industries and innovation focused economy has led to interest in developing its fintech industry. Taiwan authorities recognize the importance of fintech and the Financial Supervisory Commission (FSC) has stressed that fintech "should be our core competiveness" and sees fintech as the key to the development of Taiwan's investment industry. In 2015 was the first year that Taiwan loosened fintech regulations to allow banks to invest in financial technology companies. The goal is to double coverage/usage of e-payment rates (current rate is 25% -27%) and fundraising to establish an innovation fund to train and cultivate fintech start-up companies. On May 12 2016, Taiwan's Cabinet green-lighted Apply Pay and other international mobile payment services' operations. It also requested that the FSC continue to loosen related laws.

Compared with other countries, Taiwan is at the early stage of fintech development. The policies that FSC announced demonstrate that financial institutions have a need for big data consolidation, cloud technology, artificial intelligence, mobile bank, mobile payment/e-payment, block chain technology, online lending, and crowdfunding companies in the market. With foreign banks accounting for only 1.12% of bank deposits and 3.11% of loans in Taiwan as of 2014, there is still a relatively open-market to develop with products and services from the United States.

### SMART BUILDINGS

Despite its efforts to develop renewable sources of energy, Taiwan remains a large end-user of fossil fuels. In order to address this, Taiwan has been actively promoting energy efficiency and conservation initiatives to reduce petroleum dependency and negative environmental impact. Taiwan's Master plan on Energy Conservation and GHGs Emission Reduction has set targets of energy efficiency of 33% and decreasing its energy intensity by 50% by 2025. A major component of its energy efficiency initiatives entails expanding its use of smart buildings technology.

### SMART TRANSPORTATION

Taiwan in many ways has been at the forefront of developing modern transportation systems. Taipei's well-managed and integrated bus, subway, elevated rail lines, and Gondola lift move efficiently and connect to the countrywide intercity rail networks. There is an Island-wide electronic toll system in place and electronic monitoring of parking spaces is the norm rather than the exception. At the Taipei Main Station one can board the Taiwan High Speed Rail (HSR) and traverse the island from end to end in 96 minutes traveling at 186mph (300km/h). The city's metro card, the Easycard, is a convenient, cash-reloadable contactless smartcard used to pay for all transportation and is also accepted at hundreds

of convenience stores, libraries, supermarkets, and other locations. However, outside of Taipei, in cities such as Taichung, public transportation is underdeveloped and fragmented. In Kaohsiung, widely considered the southern capital of Taiwan, the city is developing its own transportation systems, largely independent of Taipei.

## CHALLENGES

The most significant challenge that U.S. companies will find in Taiwan is local competition. The ICT sector is well developed and there is a strong desire from the government to spur domestic innovation and development. That said, smart technology companies that offer unique solutions will find that Taiwan offers a friendly and motivated government, transparent rule of law and an exceptionally forward thinking populace interested in Smart Technology development opportunities.

## FEATURED CITIES AND/OR PROJECTS

**Taipei:**

Taipei's Smart City Project Management Office – formed in March 2016 is the first city-level program in Taiwan dedicated to Smart City activities. It is responsible for managing their "Airbox" program (community PM 2.5 air quality monitoring) as well as a broad-based smart city program that will include the building 6 Smart Public Housing projects that include designated plans for e-healthcare, e-transportation and IoT-based civic engagement.

**Taoyuan:**

In 2014, the Taiwan government announced the Taoyuan Aerotropolis, a massive $ $20 billion project to expand and redevelop the Taoyuan International Airport area. It is viewed by many as the most important project in the next 40-50 years and an opportunity to 'make or break Taiwan' as it attempts to redefine its position in Asia. The project is nearly twelve square miles in size and incorporates Smart Technologies throughout the site. Since the project was initiated by the Ma administration, there is some concern that the new Tsai Ying-wen administration, which came in power in 2016 will redefine the project. However, common belief is that this project will proceed.

**Taichung:**

Taichung, a modern industrial city in central Taiwan, is set to build the Shui-Nan Smart City as a flagship project of its Industry 4.0 initiative. There is a planned innovation cluster for Taiwan's aerospace and smart manufacturing industries. Located in the heart of Taichung, the proposed development area of 630 acres is part of the original land area of Taichung Airport, and is recognized to be the last large land development opportunity.

## RESOURCES

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# Thailand Smart Cities Guide

## SMART CITY OVERVIEW

The Thai government's focus on smart city projects aligns closely with its national policy of building a digital economy and a digital society. The national policy is ambitious; not only does it address digital infrastructure and a digital economy, but also it covers a variety of services, e-commerce, e-education, e-industry and e-government. Under the *Smart Grid Policy, Plans and Roadmap*, part of the Ministry of Energy's twenty-year National Power Development Plan (2015 - 2036), the Thai Government aims to:

- enhance power generation capacity, reliability and quality of the power supply
- engage in energy sustainability and efficiency
- strengthen utility operation and services
- leverage on the national economic and industrial competitiveness

## KEY INITIATIVES FEAT (BY SECTOR)

- **Electricity Generating Authority of Thailand (EGAT):** Under Thailand's Smart Grid Policy, Plans and Roadmap, EGAT will develop a smart grid system that will support the modernization of power generation in Thailand that will increase energy efficiency and reduce global warming.
    - EGAT will take the lead on a pilot project to develop a smart grid system at Mae Hong Sorn Province. This is a three year project with an estimated investment of Thai Bhat 780 million ($ 22.6 million). The system will focus on:
    - *Smart Energy:* Renewable Energy Development, Energy Storage and Charging System
    - *Smart City*: Energy Efficiency Management System
    - *Smart System:* Demand Side and Response Management, Energy Efficiency and Automatic Metering Infrastructure
    - *Smart Learning:* Smart capacity building programs
- **Provincial Electricity Authority (PEA):** Under the same national plan, PEA is to undertake a pilot smart city project in Pattaya City, Chonburi Province, with plans to install 120,000 automatic meter readers and the deployment of energy efficiency and automatic metering infrastructure throughout the city. This is a three year project (2016 - 2019) with a total investment of Bhat 1,069 million ($ 29 million).
- There are also rumors of a smart city plan for the city of Phuket in southern Thailand. As reported in the Bangkok Post in March 2016, the government will earmark 430 million Bhat ($ 12.4 million) from the 2016 fiscal budget to pursue its plan to develop Phuket as a smart city. The fund will be used to finance several projects such as the building of an innovation park to facilitate start-up entrepreneurs as well as training courses as part of a digital entrepreneurship program.
    - According to Thailand's Information and Communication Technology Minister the smart city project has moved a step forward after Thailand's Prince of Songkhla University and Busan University (South Korea) entered a partnership to exchange researchers to support start-up projects. The letter of intent for the cooperation, covering knowledge and technology sharing, was signed in Busan in March 2016 by the mayor of Busan and Phuket's governor. Phuket is now working on its innovation park, located at the Prince of Songkhla University, in

collaboration with CAT Telecom – the state-owned company that runs Thailand's international telecommunications infrastructure – which will provide the Internet infrastructure.

## CHALLENGES

Political stability is always a concern in Thailand. Change of governments and cabinet members cause inconsistency in policy implementation. The lack of consistent political support could delay progress towards realizing the country's Power Development Plan including smart grid/ smart city projects.

Lack of cooperation between regulatory authorities is also presents challenges. The fact that EGAT – the sole public producer of power – falls under the Ministry of Energy, while the PEA and Metropolitan Electricity Authority (MEA) – the only two distribution and utility providers – fall under the Ministry of Interior creates additional challenges for planning and implementation of critical power policies.

# Turkey Smart Cities Guide

## SMART CITY OVERVIEW

Smart City projects in Turkey are fewer in number than those in European countries and in the US. This is both an opportunity and a challenge. The Ministry of Development with the help of all the other relevant ministries, has prepared the Information Society Strategy and Action Plan for 2015-2018. According to this study, many cities have already introduced smart applications, particularly in transport and urban services. Accessing services through electronic channels and e-government is the most popular application within municipalities. However smart applications in the fields of energy and water management are on their way with SCADA and GIS applications in particular by electric utilities and water and sewage administrations in major cities. Smart metering is yet in very early stages.

## KEY INITIATIVES (BY SECTOR)

### SMART ENERGY

Turkey will spend over $5 billion over the next 5 years for the implementation of smart grids, smart metering and intelligent street lighting. Out of 21 electric distribution utilities in Turkey, 13 are in the various stages of implementing smart grid systems while others are studying different technologies. Turkish Government is enforcing usage of LED street lighting which will be implemented during the next 5 years. Limited number of utilities are using smart meters, which is expected to boom in a couple of years' time.

### SMART MOBILITY

Intelligent Transportation Systems (ITS) are being installed in many cities of Turkey. However except the major cities, such as Istanbul, Izmir, and Ankara, the majority are only in initial phases. The Ministry of Transportation has stated in their Action Plan 2013-2023, all cities will implement smart traffic light systems according to the traffic density. Green wave systems, where cars after encountering one red light will pass through green lights if they maintain a specific speed. Also to be included are digital traffic signs and solar powered bus stops with digital arrival time boards. Currently, all smart transportation projects are planned and realized by local municipalities, some using their own resources, whereas some use other local or foreign funding resources. Since there's no central ITS institution, it is not possible to get a total amount spent or planned to be spent for all the projects in Turkey.

**ISTANBUL, Turkey**

Population Growth, 2013-2014:
**1.3%**

Total Employment, 2014 (Thousands):
**4,961 People**

Real GDP Growth 2013-2014:
**5.6%**

Employment Growth, 2010-2014:
**5.9%**

*Brookings Metro*

### SMART INFRASTRUCTURE

Preventing water losses is a main priority for the Turkish government. The water authorities of some large and industrialized cities in Turkey have implemented supervisory Control and Data Acquisition (SCADA) systems to identify water losses and network failures. However, there is a need to expand this system to less developed regions of Turkey as well. In some major cities waste to energy systems are being implemented. However, projects on collection and separation of waste through smart systems in various cities are required. These projects will probably be implemented through BOT method. Overall, implementation of smart city projects in the environment sector is not as widespread as others like transportation. Some pilot cities have been chosen such as Karaman to initiate smart waste collection.

## FEATURED CITIES AND/OR PROJECTS

**Istanbul:**

Istanbul is part of the Smart City Service Development Kit (CitySDK) and its application pilot project, which is funded by the European Union's ICT Policy Support Program as part of the Competitiveness and Innovation Framework Program (CIP) and led by Forum Virium Helsinki. CitySDK is a pan-European project that will create a service development kit enabling the creation of applications across partner cities in the domains of smart mobility, smart tourism and smart participation.

The U.S. Trade & Development Agency (USTDA) has awarded a grant to the Istanbul Metropolitan Municipality (IMM), the administrative body responsible for the general management of Istanbul. The grant provides technical assistance to improve city operations, enhance crisis and disaster management, and provide efficient and reliable public services for the citizens of Istanbul. The project will focus on big data on procuring advanced IT solutions and developing a cloud-based environment capable of aggregating data from existing municipal databases.

IBM and Vodafone cooperated with IMM Transportation Corp to make a smart transportation project. IBM utilized its data processing and analysis solutions, Vodafone used its mobile communication technologies and Transportation Corp utilized its analytical and transportation knowledge. Additionally IBM launched Turkish Smart Cities Technology Center, which provides technological solutions to the problems generated by urban life.

Smart Mobility applications are very widely used in Istanbul. Pedestrian Electronic Detection System project by Isbak, Istanbul Municipality's transportation telecommunication and security technology company, aims to prevent the delay rates at the crossroads and abolish the emission of harmful gases. It is a smart signalization and electronic supervision system. In the `Talking Roads & Talking Vehicles` project, which is an EU project performed by the Turkish private companies Koc Sistem and Otokar, the system is able to send particular warnings 400 meters beforehand to the vehicle that approaches a crossroad.

Belbim, the Istanbul Municipality Informatics company integrated NFC technology with the Istanbul Card. Belbim's parking automation system and unmanned payment kiosk for ISPARK, Istanbul Municipality's parking management company, is in the test phase. ISPARK utilizes the Istanbul Card in marinas for the boat parking fee collection. The company is also realizing a smart bicycle renting system.

IETT, Istanbul Municipality's bus and tram company, realized smart bus/tram stops in 750 different points accompanied with the MobIETT application which enables passengers to access the information of the smart stops. A special card is developed for the visually impaired citizens. If they swipe their cards at the smarts stops, they can get information vocally.

**Izmir:**

- Izmir has a SCADA system to centrally manage the water distribution system.
- With WizmirNET project, -zmir Municipality provides Internet in the open areas.
- -zmir Municipality has activated the Trunked Radio System, which even works in the times of disaster and emergency.
- Izmir has a very advanced transportation system which is mentioned in the smart mobility section and the city has plans to do more investments in this sector.

## CHALLENGES

Barriers are mainly lack of funding and qualified human resources. The lack of GIS infrastructure is another challenge; only 3% of municipalities have completed their GIS investments or implemented GIS systems.

## UPCOMING EVENTS CALENDAR

- October 2016: WICS – World Intelligent Cities Summit & Exhibition – Ankara; http://www.wicsummit.com/
- October 2016: SBE16 – The sustainable Built Environment Conference – Istanbul; http://www.sbeistanbul.com/
- March 2017: Antalya City Expo – Antalya; http://www.anfascityexpo.com/
- April 2017: The 4th International Istanbul Smart Grid and Cities Congress – Istanbul; http://www.icsgistanbul.com/en/
- May 2017: International Smart City Congress – Ankara: http://www.akillisehirlerkonferansi.com/
- October, 2017: Kent Expo Urbanism and City Demands Fair – Izmir; http://kentexpo.izfas.com.tr/en/anasayfa/

## KEY ORGANIZATIONS:

- Smart City Institute - http://www.akillisehirenstitusu.com/ & http://www.novusens.com/
- Turkish Green Building Institute - http://www.cedbik.org/default_eng.asp
- Turkish Informatics Foundation - http://www.tbv.org.tr/en/
- Public Technology Platform - http://www.kamuteknolojiplatformu.org/

## RESOURCES:

- Commercial Service: Yaprak Cakilcioglu – yaprak.cakicioglu@trade.gov

# Uganda Smart Cities Guide

## SMART CITY OVERVIEW

USAID and other organizations have recognized the opportunities for smart city solutions in Ugandan cities such as Kampala. For example, The World Bank chose Kampala to host the upcoming East and Central Africa Cities Development Forum. However, it is unclear if the Government of Uganda drives the interest of smart solutions.

## KEY INITIATIVES (BY SECTOR)

### SMART TRANSPORTATION

Kampala Capital City Authority (KCCA) has identified, in its strategic plan, key components of an integrated transport network including developing multimodal transportation. Public buses were recently introduced although the initial project has since been delayed. The passenger train service has also recently been introduced.

### SMART ELECTRICITY

Prepaid meters are in place for electricity. Not all Kampala city dwellers use prepaid electricity meters but UMEME is rolling out to the other parts (and countrywide).

### ICT

- The National Information Technology Authority-Uganda is implementing the National Data Transmission Backbone Infrastructure and e-Government infrastructure project. Some phases of the project have been implemented.
- Some towns (e.g. Kampala, Jinja, and Entebbe) and Government ministries are connected to a functional network fiber cable.
- A few online services are functional including electronic payment of taxes, registration of tax identification number for tax purposes, business name reservation and land title verification.

## UPCOMING EVENTS CALENDAR

- October 2-11, 2016: International Trade Fair

# Ukraine Smart Cities Guide

## SMART CITY OVERVIEW

Ukraine is the largest country in Europe by area and the sixth largest by population, making it the world's 32nd most populous country. In terms of human resources, Ukraine is among the world's top ten most intellectually developed nations. It ranks fourth place in the world by the number of people with higher education. Smart City is a new trend in Ukraine initially targeting Kyiv and Lviv. In October 2015, Kyiv Investment Agency, presented Kyiv Smart City Concept. Kyiv Investment Agency is an organization that would coordinate smart city projects on behalf of Kyiv City Administration. In April 2016, Kyiv Smart City Expert Council was formed. The main task of the Council is to evaluate the initiatives and to enable public control over smart city projects selection, decision-making and implementation of Kyiv Smart City Concept. However, lack of financing and expertise will continue to stall the smart city initiatives implementation. Kyiv is still trying to find the best legal framework for private –public partnership to be offered to companies willing to participate in Kyiv smart city development.

## KEY INITIATIVES (BY SECTOR)

### SMART E-GOVERNANCE

- Property management system - a complex system for managing communal properties of the Kyiv City Administration
- Electronic services – transparent public services for residents of Kyiv.
- Electronic passport office - to create registry of Kyiv's residents and property owners.

### SMART SAFETY

- Police surveillance system and operational control. The aim is to introduce video surveillance intelligent tools and analytics to improve the efficiency of the work of the police, to reduce response time, to create municipal police units to ensure additional safety in the city.

### INTELLIGENT TRANSPORTATION SYSTEMS

- Single public transport e-ticket
- Transport dispatch control for managing the movement of public transport in Kyiv and optimizing fuel consumption
- Smart transport management system – to improve the efficiency of the city's transport system and to significantly optimize traffic within the city.

## CHALLENGES

No specific challenges have been identified at this time.

## FEATURED CITIES AND/OR PROJECTS

**Kyiv:**

Kyiv is one of the largest and most promising cities in Central and Eastern Europe – a capital city with developed infrastructure, significant resources, great human and knowledge potential and gradually growing innovative sector, primarily in the segment of information and communication technologies. As of today, Kyiv has implemented:

*Kyiv Citizen Card* – Multifunctional electronic ID card which is a carrier of the cardholder's personal data. The card supports various applications relating to the provision of social welfare benefits, city service and many other functional options.

*Online Participatory Budget* – public access to information concerning the planning and execution of Kyiv city budget.

*Electronic Procurement* – a system to ensure transparent and effective public spending and to prevent corruption through public scrutiny and expanded range of suppliers.

*E-services* – around twenty online services have been launched.

*1551 Service* – in addition to existing Kyiv 1551 hot line, the same service has been launched on a website of Kyiv City Administration. Citizens can also now download the 1551 application for iOS and Android to get updates and report on issues in the city.

*Health Portal* - every citizen of Kiev can quickly and easily find out if needed medication is in stock in the capital's hospitals.

*Easy Access to Subway* – in 2015, Kiev became the fourth city in the world, where a new fare technology in the City Metro was implemented.

*Wi-Fi in Subway* – passengers can use free Internet on most central stations.

## UPCOMING EVENTS CALENDAR

- Kyiv Smart City Forum -TBD
- Lviv Smart City Day – TBD

## LINKS

Kyiv Smart City
http://www.kyivsmartcity.com/?lang=en

## RESOURCES:

SC: Iulia Myronenko: iulia.myronenko@trade.gov

# United Arab Emirates Smart Cities Guide

## BASIC DATA ON THE ECONOMY

GDP – Per Capita: $43,089

Major Urban Areas: Dubai: 2.46 million; Abu Dhabi : 2.65 million

UAE Population: 9.46 million

Industries: Petroleum, Construction, Aerospace, Tourism

## SMART CITY OVERVIEW

The United Arab Emirates is a rapidly emerging economy and is at the forefront of technological innovation in the Middle East. Increasing social consciousness of energy usage and government desires to diversify the economy by drawing technological innovation to the Gulf are primary drivers behind Dubai and and Abu Dhabi's smart city campaigns.

84% of the UAE's population currently lives in urban environments, 96% use the Internet frequently, 77% use smartphones on a daily basis, and 85% of households have access to broadband Internet.

**DUBAI, United Arab Emirates**

Population Growth, 2013-2014:
**1.7%**

Total Employment, 2014 (Thousands):
**2,080 People**

Real GDP Growth 2013-2014:
**0.77%**

Employment Growth, 2010-2014:
**2.6%**

*Brookings Metro*

The Government of Dubai, the Dubai Smart City Office, the Government of Abu Dhabi, the Masdar Institute of Science & Technology, and Abu Dhabi Technological Development Committee have been collaborating on various innovative, smart tech projects since 2011. At present, the UAE is employing over 100 strategies in six focus areas to transform over 1,000 government agencies and functions to elevate Dubai and Abu Dhabi's Smart City Index rating.

The United Arab Emirates have long been regarded as leaders in science and technology in the Middle East, and is constructing spaces to accommodate all kinds of global innovators, from tech industry giants and engineering firms, to startups and universities, thanks to the UAE's 2021 Smart Strategy.

## KEY INITIATIVES (BY SECTOR)

### SMART ENERGY

- Shams Dubai: All homes to be fitted with solar panels by 2018.
- Masdar City: Two desalination plants in operation, several solar facilities, and the Al Reyadah carbon capture & recycling plant.
- Mohamed Bin Rashid Al Maktoum Solar Park: Will provide 1,000 MW of solar energy (7% of total energy) by 2020; 35% of total by 2030.
- $ $7 billion allocated to smart grid renovations by Dubai Utilities District, including water reservoirs & clean coal.
- Waste Elimination: Loss in power transmission 3.25% (6-7% in EU), water loss is 8.2% (15% in North America), with $2 billion invested in reduction plans.
- Integrated energy strategy to employ nine new clean energy strategies by 2025.

## SMART MOBILITY

- Dubai Metro to construct 421 km of new metro lines, including 150 new stations.
- Dubai plans to increase public transportation's share of total mobility by 20% by 2020.
- Abu Dhabi Traffic Management: AD to implement new computerized traffic control system ('Scoot' system) to manage traffic flows.
- Dubai to construct 900 km of bicycle and pedestrian pathways by 2021.
- The number of vehicles in Dubai nearly doubled from 740,000 in 2006 to 1.4 million in 2014. This average annual increase of 8.2% is one of the highest in the world. Multiple back-end data monitoring & management systems will manage traffic flows and eliminate congestion, similar to Abu Dhabi.
- Wireless sensors monitoring parking availability, traffic, auto incidents, road usage, etc. will communicate information to multi-modal data synthesis centers in Dubai, which will then communicate updates to drivers via a mobile app.
- Dubai & Abu Dhabi currently conducted large-scale studies on driverless cars for usage at World Expo 2020.

## SMART BUILDING

- Estidama: Abu Dhabi now rates new buildings via a "pearl system" measuring building sustainability. The first building measuring 5 pearls on the Estidama system was built in Masdar City in 2015.
- Dubai plans to implement Building Management Systems in all new and government buildings. Systems will synthesize data collected from wireless sensors to decrease energy and water wastage.
- Dubai plans to reduce water & energy usage by 30% by 2030.
- Abu Dhabi plans to implement facility management systems in hospitality buildings, which can self-calculate personnel, energy, & supplies needed for scheduled events.
- Dubai has the 9th largest square footage of smart building space in the world.

## SMART HEALTHCARE

- Dubai plans to implement an Electronic Medical Records and Hospital Information System by 2017. The system will create a centralized patient record system for all healthcare facilities in Dubai.
- Dubai Healthcare Authority is currently investigating Telemedicine options, and may create an online symptom checking platform for patients to remotely access healthcare.
- Abu Dhabi plans to implement tablet check-in platforms in all healthcare facilities to help eliminate wait times for patients, including symptom self-reporting at check-in.
- New data analysis systems will compile healthcare analytics reports for each facility & national trends to identify major public health risks.
- UAE currently lacks regulated method of compiling national healthcare data; centralized health system will allow for creation of data-driven health policies.

## FEATURED CITIES AND/OR PROJECTS

**Masdar City:**

Emirate: Abu Dhabi
Population: 40,000 (anticipated)
Web: www.masdar.ae

Established in 2008 under Sheikh Mohammed bin Zayed Al Nahyan's subsidiary company Mubadala, Masdar City is a "greenprint" for rapidly urbanizing, self-sustaining cities of the future. The site contains the largest installation of solar panels in the Middle East, and generated over 2,960,000 Mwh of wind, solar, and hydropower in 2015, far more than the 46,513 Mwh of energy the site expended that same year. Every building in the site is LEEDS or Estidama certified, and Masdar is

home to the Masdar Institute and the International Renewable Energy Agency's headquarters. In 2012, the city won the Best Environmentally Sustainable Build Award in the International Awards for Livable Communities.

**Tecom Park:**

Emirate: Dubai
Population: 18,000 commuters
Web: www.tecomgroup.ae

TECOM Investment Park established a Sustainability Department in 2006, and has rapidly improved sustainability policies over the last decade. 81% of buildings are LEED-certified, and small solar panel plants exist on several buildings. In accordance with TECOM sustainability principles, all lighting, plumbing, and HVAC fixtures have been retrofitted to either more sustainable models or to include wireless sensors that monitor energy usage & reduce energy waste. Nutrient & water retention additives have been incorporated into garden soil, and existing plants were replaced with water-efficient native substitutes. All lighting & water fixtures contain restricted outputs to further reduce energy waste.

**Dubai South:**

Emirate: Dubai
Population: 1,000,000 (anticipated)
Web: www.dubaisouth.ae

As Dubai's newest urban center and the future home of World Expo 2020, Dubai South is implementingnewest smart technologies, including new systems of water management, cool-air preservation, energy management, recycled materials construction, and waste disposal. 30% of the materials used to construct the World Expo 2020 site will be reused, and 50% will be recycled post-Expo. Dubai South will be the most energy-efficient urban settlement ever constructed in UAE. Bike lanes and expanded public transportation systems will reduce petroleum usage and car emissions, while allowing the 1 million expected residents and 1 million expected non-resident commuters to easily reach their destinations without using cars.

## UPCOMING EVENTS CALENDAR

- GITEX
  October 16-20 2016
  World Trade Center Dubai, UAE
  www.gitex.com
- SMART DATA SUMMIT
  May 23-24, 2016
  Sofitel The Palm Dubai, UAE
  www.bigdata-me.com
- ARAB FUTURE CITIES SUMMIT
  November 8-9, 2016
  Palazzo Versace Dubai, UAE
  www.smartcitiesdubai.com
- GCC MUNICIPALITIES & SMART CITIES CONFERENCE
  September 27-29, 2016
  Ritz Carlton Dubai, UAE
  www.datamixgroup.com
- MIDDLE EAST SMART LIGHTING & ENERGY SUMMIT
  September 26-27, 2016
  Etihad Towers, Abu Dhabi, UAE
  www.lightingsummit.com
- SMART SKYSCRAPERS SUMMIT
  May 16-17, 2016
  Sofitel The Palm Dubai, UAE
  www.smartskyscrapers.com

## RESOURCES

**CS Info:**

Mr. Ashok Ghosh
Commercial Specialist
US Consulate Dubai
Umm Hurair 1, Dubai, UAE
Email: Ashok.Ghosh@trade.gov

## KEY ORGANIZATIONS

**Abu Dhabi:**

- Abengoa, www.abengoa.com
- ADNOC, www.adnoc.ae
- Abu Dhabi Water & Electricity, www.adwea.ae
- Dong Energy, www.dongenergy.com
- Sener, www.sener.es

**Dubai:**

- Dubai Electric & Water Authority, www.dewa.gov.ae
- The Executive Council, www.dubai.ae
- Dubai Silicon Oasis Authority, www.dsoa.ae
- Smart Dubai Agency, www.smartdubai.ae
- Dubai Plan 2021, www.dubaiplan2021.ae

## LINKS

- Smart Cities Trade News
  - Current information about upcoming trade events and forums concerning Dubai Smart City initiatives.
  - www.smartcitiesdubai.com
- UAE Interact
  - Resource of compiled information about federal policy and initiatives pertaining to Smart City developments from multiple UAE agencies. Search "Smart City" for results.
  - www.uaeinteract.com
- Dubai Plan 2021
  - Mid-term strategies for achievement of Dubai's 2030 goals, including Smart City & sustainability initiatives.
  - www.dubaiplan2021.ae
- Dubai Electricity & Water Authority
  - Overview of city-wide water & energy reduction strategies, including building requirements.
  - www.dewa.gov.ae/customer/SMARTInitiatives.aspx
- Masdar City
  - Research, Development, Investment, and Living homepage for Masdar City.
  - www.masdar.ae
- Smart Dubai Plan
  - Full outlines of all 1,000 initiatives in six focus areas over 26 government agencies to achieve the Smart Dubai policy goals by 2030, including information on 11 private partner corporations.
  - www.smartdubai

# United Kingdom Smart Cities Guide

## SMART CITY OVERVIEW

Smart City projects are exceptionally well supported in the UK and the country is indeed home to a large number of smart cities. According to a report by the European Parliament, the UK is one of only three European countries that has more than 31 cities with at least one smart initiative, the others being Italy and France. The UK Government is pushing for rapid and sustainable partnerships to realize their vision for future cities. There has been immense growth in this initiative and the UK is taking advantage of the technology sector to advance economic growth as well. The UK Government, through Innovate UK, has implemented a series of programs that provide funding directly to cities for investment in smart initiatives. Innovate UK has also launched the 'Future Cities Catapult', funded with up to $75 million over five years. The Catapult will explore ways that public services can be integrated in a smart way to boost the economy and benefit citizens and will also bring together planners and technology companies to assist the private sector in understanding the specific solutions cities require. Additionally in cooperation with the British Standards Institution, the UK Department of Business, Innovation and Skills has established a program to develop smart city standards.

**LONDON, United Kingdom**

Population Growth, 2013-2014:
**1.1%**

Total Employment, 2014 (Thousands):
**8,702 People**

Real GDP Growth 2013-2014:
**3.0%**

Employment Growth, 2010-2014:
**2.9%**

*Brookings Metro*

## KEY INITIATIVES (BY SECTOR)

### SMART MOBILITY & TRANSPORT INFRASTRUCTURE

Intelligent transport systems are important given the increasing economic impact of congestion: traffic congestion expected to cost the UK economy US$33 billion annually by 2030, a 63% increase on the cost in 2013. A wide range of intelligent transport systems has been implemented to tackle this issue including congestion charging zones and Oyster cards. The UK is also close to an electric car revolution which could see driverless vehicles charge up as they use a Scalextric-style road network across the country. The UK Ministry of Transport has said a new government strategy would be unveiled within two years to give Britain a leading position in the electric car market in both usage and production. Key to the sweeping reforms will be a systematic plan to install recharging points on roads across the UK so cars do not run out of electricity as well as thousands in London and other towns and cities.

### SMART ENERGY

The UK has quickly developed into one of the most attractive markets in the world for advanced smart grid technology and applications. Thanks to a highly competitive electricity sector and recent efforts by the government and regulators, the U.K. market offers many opportunities for innovators in the smart grid ICT segment. One of the UK flagship projects is the mass roll-out of smart meters by 2020: this involves 53 million gas and electricity meters to be replaced at a cost of $18 billion.

### SMART WATER & WASTE INFRASTRUCTURE

As a result of rowing population, it is estimated that the UK demand for water will exceed supply by 10% by 2025. In addition, climate change poses a threat to the UK's flood-prone areas. Smart technology has not been used to its full potential to address these challenges and therefore presents opportunities for business, for example to provide water utility companies with solutions in the areas of smart leakage detection, smart metering, data analytics and smart flood risk management.

With regard to waste digital technology can facilitate the transition from the linear model of making, using, and disposing of items to a circular model of reusing and remanufacturing. Opportunities for smart technologies exist in the areas of data analytics, resource management, online sharing platforms, smart bins, and optimized refuse collection.

### SMART BUILDINGS

The UK planning system is going through a renaissance in terms of applications for new construction projects for example the volume of projects that have received planning permission to accommodate London's growing population is currently at 260,000 homes. The Old Oak and Park Royal Development Corporation (ODPC) is one of the largest regeneration projects in the UK, with over 25,000 homes being built over 30 years. OPDC have committed to developing a smart city strategy for the area, which will create opportunities for trialing and implementing innovative solutions on a large scale.

### SMART HEALTHCARE

Budgetary constraints, demographic changes and increased demand continue to place a burden on an already strained health and social care system. The UK smart healthcare sector is predicted to grow by an additional $1.4 billion by 2018 as a result of the increased use of innovative technology to provide cost-effective solutions and more diverse models of care. Growth is expected in the wearables, health apps, analytics, telecare and telehealth segments as part of the push towards preventive care, independent living, and patient self-care and monitoring.

### SMART GOVERNANCE

Supporting citizen-led, bottom-up initiatives, and engaging a broad spectrum of people is at the heart of the UK smart governance strategy. At a national level, the UK Government Digital Service, part of the Cabinet Office, work with the various national departments to help them to build platforms, standards, and digital services. At city-level, Talk London, for example, was created by the Greater London Authority to enable Londoners to participate in policy making by joining online discussion, polls and surveys. SpaceHive, the platform for crowd-funding civic projects, has so far raised $2.5 million for projects across 68 cities, towns and villages since its inception in 2012. The London Datastore has over 850 datasets covering themes from employment and skills to transparency and health services. Today the Datastore receives over 30,000 visits a month. The Leeds Data Mill opens data from public, private and third sector organizations, including utilities, to reveal city conditions and opportunities. Leeds also has a digital communication project to reduce social isolation among the elderly. Open Data Bristol opens up access to Bristol's data in order to make it easier for citizens, researchers and developers to access, analyze and share information.

## CHALLENGES

The UK is an open, transparent market with no access barriers for U.S. suppliers which are indeed very active in the UK smart cities space.

A lack of funding is the major obstacle to the realization of smart cities with many local government authorities that might want to invest in the roll-out of smart city infrastructure facing financial difficulties. Another main challenge is presented by social obstacles, including the lack of consumer demand and security and privacy concerns. A further challenge for the UK in creating smart cities is that many public services are privatized to a greater extent than in other European countries and implementing smart technology that is interoperable across the various private sector suppliers is extremely challenging.

## FEATURED CITIES AND/OR PROJECTS

**London:**

London offers a fertile environment for businesses with smart city products and services, and offers a sizeable market to tap into. It is estimated that London's smart city market could reach approximately $13.4 billion by 2020 across the following sectors: smart energy, smart transport,

smart healthcare (including assisted living), smart infrastructure (combining waste and water sectors), smart governance, smart security, and smart buildings.

The deployment of smart solutions has started to address energy challenges in London (e.g. security of supply, ageing infrastructure, fuel poverty), such as trialing smart grid solutions (UK Power Networks) and installing smart meters in homes.

Transport is one of London's most advanced sectors with regards to using data and technology to improve decision-making and service delivery. Transport for London, responsible for the city's public transport and road network, is heavily reliant on data and smart technologies to optimize traffic flows and improve customer experience. Solutions which help TfL perform these tasks better present market opportunities for new and existing businesses.

**Birmingham:**

- Second largest city in the UK and the youngest city population in Europe
- Birmingham Smart City Commission focuses on using digital technologies, data and connectivity to support a more joined up approach to how services are co-produces
- TechBirmingham promotes the city's technology ecosystem by highlighting tech companies in the region and attracting technologists and entrepreneurs to the area
- Birmingham is one of the UK's major digital hubs, with over 6,000 tech firms employing some 38,300 people.

**Leeds:**

- 35% of the UK's Internet traffic is hosted in Leeds
- Over $150m investment in digital infrastructure is expected from the public sector
- Leeds has a strong digital technology sector, specializing in data analytics and management which underpins strengths across Health analytics, FinTech and Data Sciences.

**Glasgow:**

In 2013, Glasgow beat a host of other UK cities to win funding worth $35m to explore innovative ways to use technology and data to make life in the city safer, smarter and more sustainable. Glasgow Operations Centre is a state-of-the-art integrated traffic and public safety management system, created with the aid of the Innovate UK funding. The facility has the capability to provide a coordinated, real-time, intelligence-led, response to incidents large and small across the city.

The Future City Glasgow program is opening up data about the city, looking at innovative ways to harness it, and make it discoverable for everyone's use.

**Sheffield:**

- Sheffield Smart Lab seeks innovative solutions to address two major challenges that Sheffield faces: to energize the city center, and to support people to live independently
- More than 21,403 people work in the digital industry
- Companies in the region boast one of the highest rates of turnover growth of any cluster in the UK at 47%
- Energy Efficiency: residents can now borrow smart electric monitors from libraries for free and eliminate energy usage

## UPCOMING EVENTS CALENDAR

- January 23-24, 2017:
  IoT Tech Expo Global – London;
  http://www.iottechexpo.com/category/london/
- February 1-2, 2017: Smart Cities UK – London;
  http://www.smartcityuk.com/programme/
- April 2017: Smart t Future Cities – London;
  https://smarttofuture.com/

## LINKS

- Smarter UK / Tech UK: smart infrastructure initiative, https://www.techuk.org/about/smarter-uk
- Future Cities Catapult: center for excellence and innovation, http://futurecities.catapult.org.uk/
- Innovate UK: innovation agency, https://www.gov.uk/government/organisations/innovate-uk
- TechCity UK: deliver programs to accelerate the growth of digital businesses, http://www.techcityuk.com/
- HyperCatCity: consortium driving interoperable smart cities, http://www.hypercatcity.com

## RESOURCES

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# Uruguay Smart Cities Guide

## BASIC DATA ON THE ECONOMY

GDP per capita (PPP; 2015): $21,800[100]

Major urban areas: Montevideo – 1.707 million[101]

Population (July 2015): 3,341,893

Industries: food processing, electrical machinery, transportation equipment, petroleum products

## SMART CITY OVERVIEW

Uruguay is known for being a more peaceful and stable country than some of its neighbors in the South America region. It also has the highest %age of people living in urban areas in the western hemisphere at 95.3% of its total population.[102] Although only 59% of its total population uses the Internet, Uruguay exports more software than any other Latin American country as of 2014.[103] Montevideo, the economic and political capital, represents the country's only large urban area and features the vast majority of smart city initiatives.

## KEY INITIATIVES (BY SECTOR)

### ICT

In 2007, the government created the Agency for the Development of Electronic Government Management and an Informed and Knowledgeable Society. This agency has received pubic funding to encourage electronic and open government through various digital initiatives. The National Government also adopted Digital Agenda Uruguay. The Agenda sets certain goals for electronic development, including: 80% of households to have broadband Internet access, 80% of Central Administration procedures to be electronic, and publicly available electronic reports from government offices.[104] While some of these goals are yet to be met, Uruguay currently has the highest ICT Development Index (IDI) level of any Latin American country, and ranks 50th in the world.[105]

### SMART TRANSPORTATION AND MOBILITY

The Montevideo government plans to integrate smart central management for intersections with traffic lights that will include real-time information on traffic conditions. The government is still collecting traffic data.[106] A group called Gente en Bici are now pushing the Montevideo government to develop infrastructure that is more bicycle friendly.[107]

### SMART CLEAN ENERGY

Renewable energy now accounts for almost 95% of the country's electricity.[108] The Intendencia de

[100] All basic data is from the CIA World Factbook: https://www.cia.gov/library/publications/the-world-factbook/geos/uy.html

[101] https://www.cia.gov/library/publications/the-world-factbook/geos/uy.html

[102] https://www.cia.gov/library/publications/the-world-factbook/fields/2212.html#uy

[103] http://smartcitybusinessinstitute.com/index.php/en/city-halls/64-america/207-smart-cities-uruguay

[104] http://uruguaydigital.gub.uy/wps/wcm/connect/urudigital/2da1c746-5424-48b6-8e3e-c3076ea285d8/ADU+III+2011-2015+English.pdf?MOD=AJPERES

[105] http://uruguaydigital.gub.uy/wps/wcm/connect/urudigital/205aaf68-ac22-4cec-ad15-95ca4a35a2c0/IDI.pdf?MOD=AJPERES

[106] http://smartcitybusinessinstitute.com/index.php/en/city-halls/64-america/207-smart-cities-uruguay

[107] http://www.fomin.org/en-us/Home/FOMINblog/Blogs/DetailsBlog/ArtMID/13858/ArticleID/2943/Smart-mobility-Developing-solutions-for-Latin-America%E2%80%99s-urban-infrastructure.aspx

[108] http://www.theguardian.com/environment/2015/dec/03/uruguay-makes-dramatic-shift-to-nearly-95-clean-energy

Montevideo plans to introduce 50 electric cabs in the city with a broader goal to replace fossil fuels in all public transportation.[109] Uruguay now plans to reduce carbon emissions by 88% by 2017.[110]

## FEATURED CITIES AND/OR PROJECTS

**Montevideo:**

- Mercer ranked Montevideo as the city with the best quality of life in Latin America in 2015.[111]
- Proyecto Montevideo 2030 is a project to create a more integrated and open city. Some of its plans include promoting active bicycle transport and revitalizing public spaces in the city.[112]

[109] http://smartcitybusinessinstitute.com/index.php/en/city-halls/64-america/207-smart-cities-uruguay

[110] http://www.theguardian.com/environment/2015/dec/03/uruguay-makes-dramatic-shift-to-nearly-95-clean-energy

[111] http://www.uk.mercer.com/newsroom/2015-quality-of-living-survey.html

[112] http://mvd2030.montevideo.gub.uy/content/proyecto-montevideo-2030

# Vietnam Smart City Guide

## BASIC DATA ON THE ECONOMY

Population: 94 million (July 2015 est.)

GDP: $198.8 billion (nominal, 2015 est.); $550 billion (PPP, 2015 est.)

GDP growth: 6.7% (2015 est.)

## SMART CITY OVERVIEW

The smart city concept was introduced in Vietnam in 2007 when the Ministry of Construction conducted a study on urban infrastructure planning for the development of a smart city in Vietnam. Vietnamese municipalities have since paid increasing attention to planning and managing urban infrastructure as the population rapidly urbanizes. From 2010 to 2015, urbanization in Vietnam grew nearly 33 % per year. As of 2015, one in three Vietnamese people lives in urban areas. The United Nations projects that half of the Vietnamese will live in cities by 2040.

Multinational companies, including well-known U.S. information and communication technology (ICT) companies, have organized several smart city conferences in Vietnam. These companies are introducing smart city technologies and solutions to Vietnamese authorities and municipalities while at the same time educating them on the benefits of applying smart technology to planning and managing urban infrastructure and providing better public services to people and businesses.

Growing Internet and mobile phone penetration is helping to drive smart city development and e-government solutions. As of December 2015, Vietnam has 49 million Internet users and 36 million broadband Internet subscribers, with a penetration rate of 52 % and 40 %, respectively. The country has 136 million mobile phone subscribers and 20.7 million smart phone users, with a penetration rate of 144 % and 22 %. Significant financing support provided by international donors, such as the World Bank, is behind this growth. As the Vietnamese government continues to encourage and facilitate public-private partnerships in urban infrastructure projects, more funding will likely become available for the development of smart cities in major cities throughout Vietnam.

**HO CHI MINH CITY, Vietnam**

Population Growth, 2013-2014:
**2.2%**

Total Employment, 2014 (Thousands):
**4,313 People**

Real GDP Growth 2013-2014:
**7.1%**

Employment Growth, 2010-2014:
**3.9%**

*Brookings Metro*

## KEY INITIATIVES (BY SECTOR)

Vietnamese governments at both the central and city levels have institutionalized their strong support of smart city development in Vietnam. Below are some recent directives that demonstrate this commitment.

- Resolution #36-NQ/TW issued by the Vietnam Political Bureau in March 2014 provides direction on promoting ICT applications to serve the purpose of sustainable economic growth and international integration.
- Resolution #36a/NQ-CP issued by the Prime Minister in October 2014, provides direction on developing e-government in Vietnam with the objectives of enhancing the capacities of governmental agencies and better serving residents and businesses.
- In April 2015, the Prime Minister issued Resolution #26/NQ-CP, which specifies Ministry and local authority responsibilities in creating action plans, implementing, monitoring, and evaluating ICT application and development processes.

- Decision No.1819/QD-TTg provides specific guidelines for applying ICT, specifically for e-government services and transportation management.
- Ho Chi Minh City Party's Committee issued Decree 08 in January 2015, which provides direction on promoting ICT applications to the management of a few priority sectors including: healthcare, transportation, environmental monitoring and cybersecurity.

## CHALLENGES

Vietnam's high level of foreign debt may impede the development of smart cities in the future. According to the Ministry of Finance, Vietnam's foreign debt reached $82 billion in 2015, accounting for about 41.5 % of Vietnam's GDP. The Vietnamese government wants to keep foreign debt below 50 % of the country's GDP. Consequently, municipalities are struggling to justify smart city expenditures out of their own budgets. Lack of personnel who have the requisite skills and experience to plan and manage urban infrastructure and build and operate e-government service systems is another hurdle to further developing smart cities in Vietnam.

## FEATURED CITIES AND/OR PROJECTS

**Da Nang:**

Da Nang (population 950,000), is Vietnam's fourth largest city but the first to implement a smart city project in Vietnam. From 2008 to 2013, Da Nang deployed smart city infrastructure, including a metropolitan area network designed to help local government departments work more efficiently, city-wide Wi-Fi access, an e-government service platform and a data center. The World Bank funded $27 million of the $30 million total project value.

Today, Da Nang is implementing a $358 million "Sustainable City Development Project (SCDP)" which began in 2013 and is scheduled to conclude in 2019. The SCDP has five parts: (1) improvement of drainage and wastewater systems; (2) bus rapid transit development; (3) improvement of urban strategic roads; (4) technical assistance and capacity building for city authorities on urban infrastructure management; and (5) completion of infrastructure sub-projects initiated under the Da Nang Priority Infrastructure Investment Project. The World Bank will provide most of the funds – about $270 million – with the central and state governments providing the rest.

**Ho Chi Minh City:**

In 2015, Ho Chi Minh City (population 7.3 million), the economic heart and largest city in Vietnam, began implementing a "Green Transport Development Project" with a focus on city-wide infrastructure and service delivery. The project will finance the development of a 23-kilometer-long bus rapid transit system using green technology which will be capable of transporting 28,300 passengers a day. The World Bank committed $124 million to this project which is scheduled to conclude by 2020. Additionally, in 2015, Ho Chi Minh City approved a private investment of $450 million for an urban flood control project involving smart communications solutions.

Vietnam's capital, Hanoi (population 7.1 million), is promoting more environmentally sustainable transport modes and urban development plans through its Urban Transport Development Project. This project includes plans to lower Hanoi's transport-related greenhouse gas emissions through the introduction of enhanced road and bus infrastructure.

In addition, municipalities of several other cities have expressed interest in developing smart cities in the future, including: Thai Nguyen, Hai Phong, Quang Ninh, Nha Trang, Binh Duong, Da Lat, Can Tho, and An Giang.

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LANE
FIRE

# INDUSTRY SECTORS

**ITA: Industry and Analysis Business Unit**

ITA's Industry & Analysis' (I&A) staff of industry, trade and economic analysts devise and implement international trade, investment, and export promotion strategies that strengthen the global competitiveness of U.S. industries. These initiatives unlock export and investment opportunities for U.S. businesses by combining in-depth quantitative and qualitative analysis with ITA's industry relationships.

I&A does this by representing the interests of U.S. industry in trade negotiations, advocating on behalf of industry with foreign governments, publishing research on global opportunities for U.S. industry, and executing export promotion programs. Our efforts ensure that foreign markets are open for U.S. industry, and help guide U.S. businesses toward the best export markets for their products and services. Industry & Analysis also seeks opportunities to enter into strategic public private partnerships with companies and non-profit associations to achieve mutual export and competitiveness objectives.

The following offices in I&A cover sectors included in many smart city applications, such as information and communications technology (ICT), energy and water, building infrastructure, and transportation.

## OFFICE OF HEALTH AND INFORMATION TECHNOLOGIES

The Role of Information and Communications Technology (ICT) and Health IT in Smart Cities

### OVERVIEW

In many respects, smart city technology is really just an Internet of Things (IoT) deployment at scale. The IoT describes interconnected and Internet-connected physical objects embedded with electronics, sensors, software, and connectivity that allows the collection and exchange of data. Like in IoT, the role of ICT in a smart city context is to enable the "smart" aspects of the broader city infrastructure.

The development of smart city technology is often driven by the convergence of broadband deployment, low-cost connected sensors, and emerging machine intelligence to analyze and interpret the collected data closer to the consumer. The growth of smart cities provides business opportunities for ICT companies focused on aspects of sensing, communicating, and analyzing information. U.S. exporters capable of partnering with companies in smart city application sectors – such as energy, water management, transportation, and building products – will be best positioned to compete for business in foreign cities and communities.

## ICT HARDWARE - SUB-SECTOR OPPORTUNITIES

### SENSORS

Many smart city use cases will be dependent on the deployment of sensors to continuously monitor the city's overall status and the status of particular assets such as buildings, lighting and traffic control infrastructure, water and sewerage systems, and vehicles. These devices will make up many of the "things" as IoT deployment worldwide increases by billions of sensors in the next few years. Since these sensors may be left in the field for years, smart city planners will generally look to purchase low-cost yet reliable, long-lasting, and low-power sensors. Suppliers that can meet those criteria will find business success abroad.

### COMMUNICATIONS NETWORK EQUIPMENT

As smart city technology is deployed and cities gather more data from sensors and other inputs, cities will need to install additional communication capacity accordingly. This creates opportunities for a wide range of ICT companies that can offer Internet and cellular connectivity options. Initially, many cities will need to deploy or expand broadband Internet capability to collect and process the incoming data. As cities create their smart city programs, they often also create public Wi-Fi networks by adding Wi-Fi hotspots to other infrastructure. Even with an increase in Internet bandwidth, cities will also have to rely on cellular connectivity for some smart city use cases. This will be especially relevant in communities with poor wired Internet infrastructure or in sparsely populated regions. Companies that deploy alternative communications networks, such as low-power, wide-area networks (LPWANs), will also find good business opportunities in many foreign smart city projects.

### COMPUTING

While many smart city applications will rely on cloud computing to analyze the collected data, there may be smart city opportunities for manufacturers of edge computing equipment, including low-power, low-cost single board and embedded systems. An edge-computing model pushes computing applications, data, and services away from centralized nodes to the edges of a network, enabling the "smart" capabilities of smart city infrastructure. Instead of relying on cloud computing to compile and analyze data from a fleet of sensors, edge computing could make each distinct thing in the system "smart" in itself. Smart sensors would be able to collect information and act on that information in real time. In areas with poor Internet or cellular connectivity, this may be an attractive technology.

### HEALTH INFORMATION TECHNOLOGY (HEALTH IT)

One of the possible uses for ICT infrastructure being built to connect cities and regions under the Smart Cities umbrella is to deliver improved healthcare for the citizens in the city/region. This is currently being looked at very closely by stakeholders in many countries in order to slow down the rapidly increasing level of healthcare expenditure needed to treat chronic diseases and health conditions, and the ability to provide more frequent, targeted and appropriate care to patients both inside and outside healthcare institutions. Some of the possible health-related applications that would benefit from the increased interconnectivity offered by Smart Cities projects include electronic health records; use of electronic health cards where patient health information can be stored; and remote monitoring of patients from home or in other non-health institutions, where the monitoring products can continuously record a patient's vital signs and notify healthcare professionals if an intervention is needed.

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## OFFICE OF DIGITAL SERVICES AND INDUSTRIES

### SMART CITY TECHNOLOGY INVESTMENT AND TRADE

Over half of the world's population already lives in cities, and by 2050, it is expected that 66% of the world's population will live in urban areas. [113] High urban density generates the need for improved service delivery, cost reduction, and environmental sustainability while improving the quality of life. The potential of a lucrative market stimulated the development of smart city technologies suited to urban environments, including intelligent transport systems, integrated travel ticketing, smart energy grids, smart meters, sensor networks, and an array of smartphone apps and sharing economy platforms. According to IHS, the number of smart cities worldwide will quadruple from 2013 to 2025, proliferating as local governments work with the private sector to cope with a multitude of

[113] UN Department of Economic and Social Affairs 2014 < http://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf>

challenges confronting urban centers.[114] There are expected to be at least 88 smart cities all over the world by 2025, up from 21 in 2013.[115] This presents an enormous opportunity for U.S. companies to provide the technology, innovation, and capital to help guide the global transition to Smart Cities.

Nearly all smart city technologies are data driven and thus generate large quantities of data which value is derived from. Data that is collected about cities and their citizen's gives insight into utilization, consumption, and behavior patterns that in turn produce greater transparency, productivity, and accountability. However, generating large amounts of data, much of it in real-time and at a highly granular scale, raises a number of concerns relating to the protection of data in the manner that its collected, processed, shared, and stored across multiple platforms both domestic and foreign. Accordingly, the challenges to the digital ecosystem raise a number of concerns including privacy laws and cross-border transfer restrictions, data localization, and cybersecurity.

## CHALLENGES

Smart city technologies support digital data flows by automation that facilitates communication with control servers and consumers. As smart city technologies become more widespread, the data generated triggers data capture, transmission, processing, storing, sharing, and automated decisions. This raises concerns relating to data protection especially since smart city technologies collect personally identifiable information (PII) and household level data about consumers including utilization, consumption habits, movements, and behaviors. From this perspective, the key challenges surrounding the protection of personal data when collected, the extent to which control is exercised upon processing of such data, as well as protection from unauthorized access, encourages business practices that are acceptable with regards to accessing and disclosing personal and sensitive information on data subjects. Moreover, while there is common ground on the importance of privacy protection, there are differences amongst nation states on approaches to privacy and data protection in terms of obtaining consent, notification of data breaches, and governance of cross-border data flows.

## INITIATIVES FOR: EU-U.S. PRIVACY SHIELD

A 2014 study conducted by the Bureau of Economic Analysis (BEA) on international services trade data showed that digitally-deliverable services traded between the United States and Europe totaled $262.7 billion in 2011.[116] It is clear that cross-border data flows (across various industry sectors, including smart city technologies) are highly significant to the U.S. - EU trade relationship; however, regulatory and legislative approaches to privacy and personal data protection vary.

While the United States and the European Union share the goal of enhancing privacy protection for their citizens, the United States takes a different approach to privacy from that taken by the European Union. The United States uses a sectoral approach that relies on a mix of legislation, regulation, and self-regulation. Given those differences and to provide organizations in the United States with a reliable mechanism for personal data transfers to the United States from the European Union while ensuring that EU data subjects continue to benefit from effective safeguards and protection as required by European legislation with respect to the processing of their personal data when they have been transferred to non-EU countries, the Department of Commerce and the European Commission agreed to the Privacy Shield Framework in February 2016.

Once in place, organizations based in the United States will be able to self-certify to this new Framework and, based on their enforceable commitments under the Framework, receive personal data from Europe in compliance with EU data protection laws. This new framework will underpin over $260 billion in digital services trade across the Atlantic annually and will provide certainty that will help grow the digital economy by ensuring that thousands of European and

[114] IHS https://technology.ihs.com/507030/

[115] Ibid

[116] Economic and Statistics Administration. <http://www.esa.doc.gov/sites/default/files/digitaleconomyandtrade2014-1-27final.pdf>

American businesses and millions of individuals can continue to access services online.

## INITIATIVES FOR: APEC CBPRS

While the combined Europe, Middle East and Africa region represented the largest number of smart cities in 2013, Asia-Pacific is expected to take over the lead in 2025.[117] In all, Asia-Pacific is expected to account for 32 smart cities in nine years' time, Europe is expected to have 31, and the Americas are expected to have 25.[118]

To help support this growth in smart cities in Asia, the United States is promoting the expansion of the Asia Pacific Economic Cooperation (APEC) Cross Border Privacy Rules (CBPR) system, which facilitates trade and strengthens consumer privacy protections and trust across the Asia Pacific region by minimizing unnecessary barriers to the cross-border flow of information due to differing levels of privacy protection regulations within the participating APEC Economies, including restrictions on cross border data transfers. The CBPR system was developed in APEC over a seven-year period; and in the 2011 Honolulu Declaration, APEC Leaders committed to the CBPR System's implementation. The United States, Mexico, Japan and Canada are currently members of the CBPR system, with Canada's participation confirmed most recently (April 1, 2015). As the system continues to grow, it will reduce the administrative burden on companies that serve multiple APEC Economies.

## DATA LOCALIZATION

Under the guise of meeting online security and privacy objectives, many governments have begun to require mandatory storage of data on servers physically located inside that country, through data localization requirements. Some countries' data protection and security laws create such extensive barriers to cross-border data flows that they effectively create data localization requirements. The idea that forcing personal data to be stored in country so that it is not subject to foreign surveillance is flawed, as information security and jurisdiction are not strictly a function of where data is physically stored or processed.

The European Centre for International Political Economy (ECIPE) released a paper in July 2014 that evaluated the potential costs for countries that have recently proposed or enacted data localization restrictions. The report found that these requirements could lead to significant GDP losses for Brazil (-0.2%), China (-1.1%), the EU (-0.4%), India (-0.1%), Indonesia (-0.5%), Korea (-0.4%) and Vietnam (-1.7%). These losses could significantly affect post-crisis economic recovery and undo the productivity increases from entering into major trade agreements.

## CYBERSECURITY

Increasing ICT complexity, hyper-connectivity, namely through 'Internet of Things' environments, as well as the generation of significant amounts of data, will also mean increasing vulnerability, both to malicious attacks and unintentional incidents.[119]

In order to guarantee service continuity and security, the ICT systems that oversee and control a 'smart city' need to be designed, from inception, with cyber security, reliability and data privacy in mind. "The right cyber security strategies can mean the difference between success and failure. The increasing urban deployment of public wireless networks, for instance, calls for robust security strategies to protect the Internet of Things connected through the city network. Information management and protection systems and backup and recovery systems for mission-critical administration data should protect citizens' privacy and identities across domains, including local tax, healthcare, education and utilities."[120]

[117] https:///technology.ihs.com/507030

[118] https://technology.ihs.com/507030/

[119] http://www.symantec.com/connect/blogs/transformational-smart-cities-cyber-security-and-resilience

[120] https://eu-smartcities.eu/sites/all/files/blog/files/Transformational%20Smart%20Cities%20-%20Symantec%20Executive%20Report.pdf

### RELEVANT WEB TIPS

Department of Commerce Office of Digital Services & Industries
http://www.trade.gov/td/services/odsi/index.html

Department of Commerce- EU- U.S. Privacy Shield
https://www.commerce.gov/privacyshield

Cross Border Privacy Rules System
http://www.cbprs.org/

NIST Cybersecurity Framework
http://www.nist.gov/cyberframework/

Department of Commerce- Economic and Statistics Administration
http://www.esa.doc.gov/sites/default/files/digitaleconomyandtrade2014-1-27final.pdf

## OFFICE OF TRANSPORTATION AND MACHINERY

### SMART CITY DEFINITION

"A city can be defined as "smart" when investments in human and social capital and traditional transport and modern communication infrastructure fuel sustainable economic development and a high quality of life, with a wise management of natural resources, through participatory action and engagement."[121] Smart cities are cities in which information and communication technology (ICT) provide insight and control over the various systems to improve the quality of life of its residents.

### SMART TRANSPORTATION OVERVIEW

By 2050, it is estimated that over 9 billion people will inhabit the globe and 7 billion of them will being living in cities. This has the potential to create even more pressure on existing transportation urban infrastructure both here and abroad, whether it is roads, ports or airstrips. Intelligent transportation systems offer way to better incorporate road vehicles into cities and address challenges that affect global transportation infrastructure.

Other goals for smart cities are for more integrated efficiency and viability over the long term of their transportation infrastructure. This will bring possible lower economic costs which are one of many benefits cities stand to gain when implementing a smart transportation management system. "Proactive planning, improved traffic forecasting and management, greater system-wide visibility, as well as optimized use of existing transportation infrastructure can lead to dramatically improved situational awareness and decision-making for cities."[122] (IBM. 2014. "Building a smarter transportation management network"). Where smart transportation is utilized, citizens will benefit from lower congestion, increased safety, reduced emissions, which will only begin to show the real possibilities of a smart city.

On the U.S. policy side, the move to support and build smart cities has been one of the Obama administration's strategic objectives for innovation, as indicated elsewhere in this document.

### DATA AND CONNECTIVITY

Sharing data via connectivity and intelligence is one of the major near-term ways road vehicles can be incorporated into the smart cities rubric. As stated by the Smart Cities Council, a for-profit association for the advancement of the smart city business sector, "A smart city gathers data from smart devices and sensors embedded in its roadways, power grids, buildings and other assets…And smart transportation uses the power of computers to optimize travel throughout the city."[123]

The data collected in smart cities will allow for better monitoring of resources and optimizing resources already available. Between vehicle-to-vehicle and vehicle-to-infrastructure, smart city technology will improve the driver experience through features including: traffic light control/messaging, parking management, traffic monitoring, providing the fastest routes, self-driving cars, automatic braking, and lane

[121] https://ideas.repec.org/p/vua/wpaper/2009-48.html

[122] IBM. 2014. "Building a smarter transportation management network". http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=LBW03019USEN&appname=skmwww

[123] https://smartcitiescouncil.com

change assistance. Typically, the applications of connected vehicle systems fall into three broad categories: safety-oriented, convenience-oriented, or commercial-oriented. Connected vehicles will be able to talk to each other with devices that constantly share important safety and mobility information with each other.

IHS Automotive forecasts that there will be 152 million actively connected cars on global transport networks by 2020.[124] Connected vehicles have the potential to transform the way cities think about safety, mobility, traffic flow management and environmental concerns. The development of a next generation transportation platform where forecasting and connectivity is the end goal, will ultimately make highly smart driving a reality.

The Department of Transportation's Connected Vehicle Program is looking to harmonize standards for interoperability within the United States to establish technical benchmarks. This may be a global model for the implementation of smart transportation technologies. By harmonizing standards, international markets will be able to realize lower life-cycle costs for the acquisition and maintenance of intelligent transportation systems.

## OPPORTUNITIES

Estimates for the smart cities market vary widely, depending partially on which technologies and sectors are included under the smart city umbrella:

- ABI Research estimates that smart cities technology is an $8.1 billion market today and will reach $39.5 billion within five years.
- Pike research forecasts that investment in smart technology infrastructure will total $108 billion during the decade from 2010 to 2020.
- The Smart 202 report claims that related technologies and industries will grow four-fold to become a $2.1 trillion market by 2020.

However, no matter the estimate used, substantial growth is expected.

So where are international market opportunities for American SMEs in the smart transportation technologies sector? Many of the opportunities are long-term rather than near-term as localities seek to make their transportation infrastructure more efficient. Any place that is growing and becoming more population-dense, such as New Delhi, Istanbul, Singapore, London and Sao Paulo, is looking to attain "smart city" credentials. American SMEs can provide the solutions to these cities' needs by improving operating systems through expertise in operation and information & communication technology, particularly within intelligent transportation systems.

DOC/ITA's ongoing foreign government trade policy involves discussions regarding the public procurement process in global smart city markets. This will enable American SMEs to have equal footing on international tenders. Most foreign government transportation departments/ministries are open to working with foreign suppliers with technical expertise, and American SMEs in smart transportation will continue to be competitive. It is important that companies are informed of the RFP/ global tender opportunities that exist, whether it is from the DOC/ITA or industry associations such as the Intelligent Transportation Systems of America or the American Public Transit Association.

ITA/I&A will continue to foster relationships with industry associations within the smart transportation sector, as well as attend shows & conferences that have a smart city/transportation focus. ITA will also continue to collaborate across agencies/offices, such as the Federal Transit Administration, the Intelligent Transportation Systems Joint Program Office, and NIST to work together to determine best practices on research & development, market intelligence and market entry strategies globally.

ITA/I&A will also add expertise to developing policies regarding this emerging sector as it relates to vehicles. Related, ITA/I&A will monitor international policies to ensure harmonized standards and regulations as it relates to emerging technologies in the automotive sector.

[124] Dorsey, Jim. 2013. "Big Data in the Connected Car." http://press.ihs.com/press-release/country-industry-forecasting/big-data-drivers-seat-connected-car-technoogical-advance

### CHALLENGES

Within the smart transportation sector, there are many challenges that are on the horizon when it comes to the success of implementing these technologies here and abroad. These barriers include:

- *Interoperability of Things* - How do we make different systems talk to each other?
- *Privacy & Security* - How do we address concerns over personal data privacy and security as intelligent transportation systems become more prevalent?
- *Cost Effectiveness* - How do we bring down the cost of smart infrastructure?
- *Dependability* - How vulnerable are these new platforms?

With such a new and emerging industry, time will tell how these challenges will be resolved, but it is imperative that American SMEs realize what is in front of them as they venture abroad. It is important that the DOC/ITA understand these barriers as the industry matures.

### SMART CITY EVENTS

- Smart Cities Week
  September 27-29, 2016 / Washington, DC
- Discover Global Markets: Building Smart Cities
  November 1-3, 2016, Chicago, IL
- Consumer Electronics Show
  January 5-8, 2017, Las Vegas, NV
- 23rd World Congress on Intelligent Transportation Systems
  October 10-14, 2016 / Melbourne, Australia
- 25th International Technical Conference on the Enhanced Safety of Vehicles
  June 5-8, 2017 / Detroit, Michigan
- 24th World Congress on Intelligent Transportation Systems
  October 29 – November 2, 2017 / Montreal, Canada

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## OFFICE OF ENERGY AND ENVIRONMENTAL INDUSTRIES

### DEFINITION

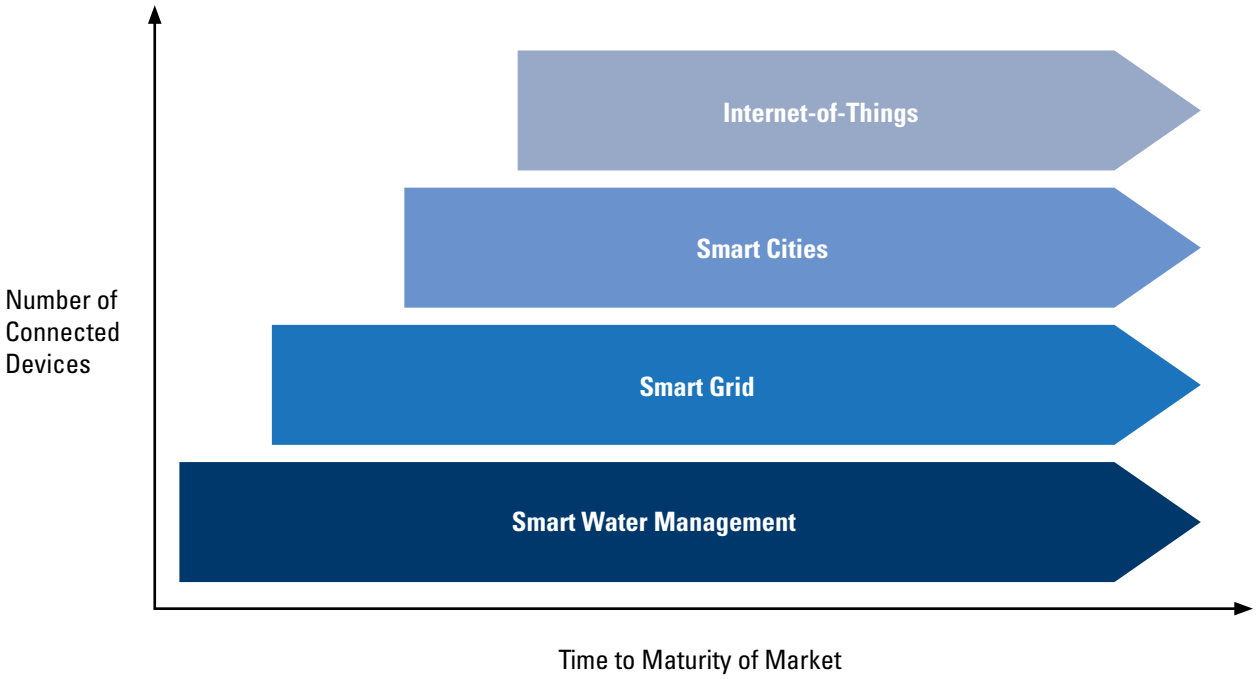
With respect to energy and environmental technologies, the deployment of goods and services that support a so-called "smart city" vary dramatically from country to country. Developing and emerging economies that lack access to basic infrastructure – electricity, sanitation, and clean drinking water are seemingly putting the cart before the horse with their "smart city" initiatives, but as they address these needs, they are aiming in the long term for a fully modernized infrastructure with easier monitoring and control. On the other hand, high- income economies are at a more advanced level focusing on integrated resource management and data collection utilizing information communication technologies (ICT) to improve resource efficiency. It is important to recognize that market opportunities exist throughout smart cities development; however, some exporters are better suited for certain stages.

The specifics of these efforts also vary greatly, as global cities face a variety of challenges across a diversity of sectors. For example, coastal cities may have a keen interest to monitor sea level rises and facilitate efficient, connected, and rapid alert systems for emergency management systems. Urban planners may also be focusing on the resilience of electricity and water supply during natural disasters. Cities with high crime rates may be focused on leveraging ICT technologies to improve response rates and reduce crime related risks. Cities with high deployment of distributed energy resources (smaller power sources such as rooftop solar that can be aggregated to provide power necessary to meet regular demand) may be focused on installing smart metering systems

and advanced analytical capabilities to improve renewable energy resource integration to the grid.

Some experts have described the smart industries discussion as a series of interrelated sector descriptions that describe the increasing number of connected devices: the number of connected devices rises the time until the market/industry is mature.

Modernization includes the build-out and upgrade of transmission and distribution (T&D) networks that extend electricity services to new populations and improve the grid's efficiency in delivering those services. In many markets, modernization goes beyond these initial T&D investments to include a range of digital technologies and platforms, including the deployment and integration of Internet Protocol (IP) based




## GLOBAL MARKET OPPORTUNITIES – BY SECTOR

### *Smart Grid (POC: Vickie Gunderson)*

Smart grid is a foundational component of the development of increasing "smartness" of global cities, and informing integrated resource planning at the local level. U.S. suppliers of smart grid technologies will find global opportunities in both Greenfield and brownfield city efforts.

The smart grid is a modernized electricity transmission and distribution network that includes two-way communication systems and enables the integration of technologies that will further improve grid efficiency, reliability and security. Depending on the market, a wide range of equipment and technology will be required to modernize the grid. communications, infrastructure ICT systems to better manage increasingly-complex utility networks and data, and online applications and consumer services that enable energy efficiency programs at the "user-end" of the grid. Global spending on grid modernization and smart grid technologies has emerged as a major growth segment in the infrastructure sector and is expected to continue to grow. Various energy market research groups have pegged market values to range from $15 to $500 billion annually, depending on specific technologies that are incorporated into the calculation. Regardless of the absolute estimated market size, the sector has been on a strong growth trajectory over the last decade and will continue to grow.

According to Bloomberg New Energy Finance, worldwide annual smart grid spending grew by 12 % in 2015, reflecting a five-year CAGR just under 13 %.[125] Other energy market research groups, including GTM Research,[126] Navigant[127] and Transparent Market Research,[128] predict that annual spending on smart grid sub-sectors will grow anywhere from 5-18 % annually over the next decade. Predictions vary dramatically across sub-categories, but spending in all areas is expected to increase in both established and emerging markets.

The ITA assesses that the current market for all U.S. smart grid exports – including T&D equipment, smart grid ICT goods and services, and energy storage technologies – is valued at $30 billion annually. These exports leverage U.S. investments to upgrade the domestic electric grid and capitalize on the growing global market.

The United States is amid an active, robust and innovative electricity modernization effort and the global market is also actively engaged. In 2013, China surpassed the United States, becoming the world's largest market for smart grid spending.[129] Drivers for the deployment and development of grid modernization equipment, technology, and services vary by region and sub-sector. A consistent theme across the world, however, is that utilities are concerned with revenue losses resulting from reduced loads driven by efficiency, increased distributed energy, and/or theft. Global investment decisions are now focused on how to do more with less. This includes looking for ways to increase supply and demand side energy management efficiencies.

For emerging economies in Southeast Asia, India, Africa and South America, the focus is on reducing theft and T&D losses while building new infrastructure to meet increasing demand, and bringing electricity to the 1.2 billion people – 17 % of the global population – who currently lack access.[130]

Europe, North America, East Asia, Australia and New Zealand have increased focus on deploying advanced metering infrastructure and big data analytics to better leverage the capabilities resulting from cloud computing advancements. Utilities in these countries are looking to improve systems management as revenues continue to decrease. According to Bloomberg New Energy Finance, many European utilities have lost over 50 % of their market value since 2010 from deployment of distributed energy resources and other efficiency gains that led to load loss.

## RELATED EVENTS:

- Power-GEN Asia; Seoul, Korea, September 20-22, 2016
- European Utility Week; Barcelona, Spain , November 15-17, 2016
- DistribuTECH, San Diego, California, January 31-February 2, 2017

### *Smart Water (POC: Maureen Hinman)*

Smart water speaks to the deployment of ICT technologies to manage the efficient treatment, distribution, storage, use, reuse, and billing of water and wastewater resources on the macro (public treatment and distribution network), meso (industrial and building level networks), and micro (household) scale within a network.

Smart water technologies are utilized widely in the United States and other OECD nations to address water scarcity, maintenance challenges associated with aging infrastructure, growing regulatory burdens, and rising production costs. The "smart water network" technology suite is categorized in several layers:

[125] Bloomberg New Energy Finance, Q1 2016 Energy Smart Technologies Market Outlook, 25 February 2016

[126] GTM Research, "Global Smart Grid Technologies and Growth Markets", 25 July 2013. Available at http://greentechmedia.com/research/report/global-smart-grid-technologies-and-growth-markets-2013-2020

[127] Navigant, Smart Grid Technologies Report, http://www.navigantresearch.com/research/smart-grid-technologies

[128] Transparent Market Research, "Smart Grid Market – Global Industry Analysis, Size, Share, Growth, Trends and Forecast 2013-2019," November 2015

[129] Bloomberg New Energy Finance, Q1 2016 Energy Smart Technologies Market Outlook, 25 February 2016

[130] International Energy Agency (IEA), World Energy Outlook, 2015.

- The first layer is the sensing and control instruments that automate physical operations and measure distribution and treatment parameters.
- This is followed by the collection and communication layer which includes technologies for storage and transmission of data.
- The third layer us for the data management and display which aggregates and interfaces data for a human operator.
- Finally, the data fusion and analysis layer provides an interface for data analytics and modeling that enables real-time network management (see Figure 1 for specific examples).[131]

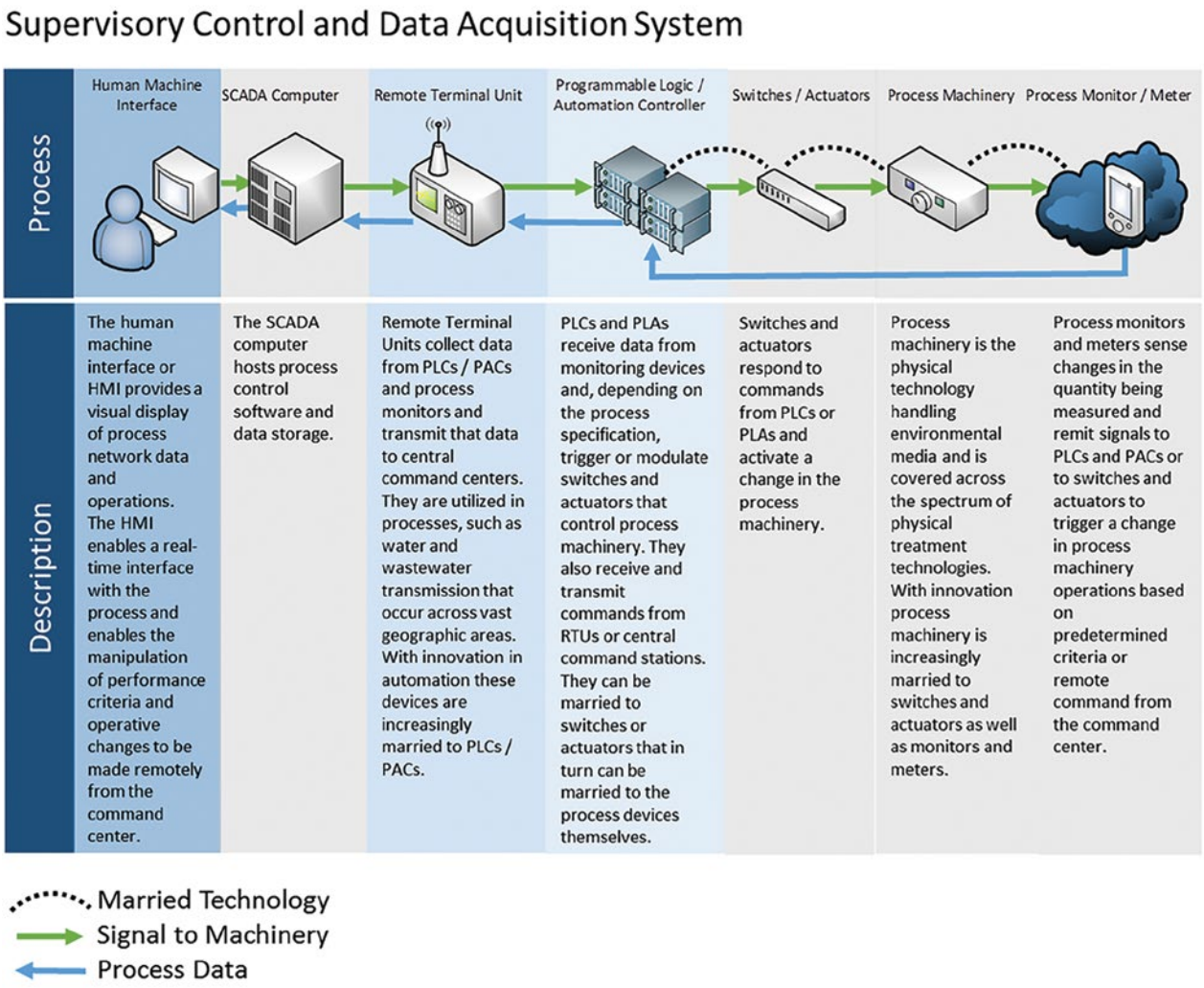
The collection and communication and data management and display layers are known in industry as a Supervisory Control and Data Acquisition or SCADA systems (see Figure 2), which serve as the electronic logic and human interface components to manufacturing, environmental management, energy production, and heating and cooling equipment.

## EXAMPLES OF SMART WATER TECHNOLOGIES BY LAYER

| Sensing and Control | Collection and Communication | Data Management and Display | Data Fusion and Analysis |
|---|---|---|---|
| • Automated pumps, valves, chemical addition equipment<br>• Automated meters<br>• Leak detection equipment<br>• Programmable Logic Controllers (PLCs)<br>• Programmable Automation Controllers (PACs)<br>• Switches and actuators | • Remote Terminal Units<br>• Fixed cable network<br>• Radio/ cellular network<br>• Wi-Fi | • Supervisory control and Data Acquisition System (SCADA) Computer<br>• Human Machine Interface<br>• GIS System | • Online water quality monitoring software<br>• Automated network monitoring software<br>• Automatic pressure optimization software<br>• Hydraulic modeling software<br>• Pumping and energy optimization software<br>• Billing and payments software |

[131] Cahn, Amir. An Overview of Smart Water Networks. AWWA Journal, July 2014.

## SCADA SYSTEMS




Since smart water technology overlaps with traditional water-specific technology, such as pumps and valves, as well as non-water specific technology, such as Programmable Logic Controllers (PLCs), quantifying market size and scope of opportunity is not straightforward. However, the global environmental market for environmental instruments and information systems, which represents a portion of the smart environmental technology market, was estimated to be worth US $12.2 billion in 2014 with the United States market accounting for nearly a fourth of the world market at US $3.7 billion.[132] Similarly, global analytical services in the environmental space are estimated to be worth US $7.0 billion in 2014 with the United States market accounting for US $1.9 billion. The most recent regional data available for global regional markets is from 2012 and highlights the United States, Western Europe, and Asia as the largest consumers of instruments and information systems (see Figure 3.)

[132] Environmental Business International 2016.

## GLOBAL MARKET ESTIMATES FOR SMART ENVIRONMENTAL SYSTEMS SEGMENTS: (1) INSTRUMENTS AND INFORMATION SYSTEMS (2) ANALYTICAL SERVICES, US $BILLIONS.

| | USA | W Europe | Japan | Asia | Latin Am | Canada | Aus/ NZ | E Europe | MidEast | Africa | Total $ | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Instruments & Information Systems** | 3.4 | 2.4 | 0.9 | 2.3 | 0.7 | 0.3 | 0.3 | 0.2 | 0.5 | 0.1 | 11.0 | 1.1% |
| **Analytical Services** | 1.9 | 1.8 | 0.4 | 1.1 | 0.3 | 0.2 | 0.3 | 0.2 | 0.4 | 0.1 | 6.7 | 0.7% |

### RELATED EVENTS:

- Singapore International Water Week, Singapore, July 10 – 14, 2016
- WETEX, Dubai, UAE, April 21-23, 2016
- WEFTEC, New Orleans, LA, September 26 – 28, 2016
- AWWA ACE, Chicago, IL, June 19 -22, 2016

## OFFICE OF MATERIALS INDUSTRIES

### BUILDING PRODUCTS SECTOR IN SMART CITIES

**Overview**

Smart Cities typically rely on information and communication technologies (ICT) to maximize city asset performance while optimizing services available to citizens. Elements considered to be the asset base of a smart city typically include public works infrastructure, transportation infrastructure, energy and water infrastructure, healthcare infrastructure, smart buildings, and a variety of government service systems.

U.S. exporters of building materials and building products will find greatest opportunity in product areas offering high efficiency and interoperable functionality with smart building design and select smart city elements such as infrastructure lighting.

### INTELLIGENT OR "SMART" BUILDINGS

Smart buildings are recognized key elements of smart cities. A smart building is generally understood as one reflecting a holistic approach to a building's design, construction, and operation to maximize efficiencies, occupant comfort and other functional priorities. The building is a system of systems that communicate both within the building and externally to optimize performance. Smart building creates immediate opportunity for design services and information and communication technologies. It also creates demand for high-quality building products with inherent efficiency and interoperable functionality compatible with smart building design.

### STREET LIGHTING AND SMART CITIES

Certain building product subsectors also often are highlighted as essential to smart city performance. One such example is smart LED street and infrastructure lighting. Smart exterior lighting is lauded globally for its contributions to energy efficiency, reduced maintenance requirements, enhanced public safety, and overall usability of the built environment.

### OTHER RESOURCES

- 2016 Top Markets Building Products and Sustainable Construction report[133]
  - Indicates "smart cities" as a trend in sustainable construction that may create opportunities for U.S. exporters of building products that are energy efficient and interoperable with relevant intelligent building systems

[133] http://trade.gov/topmarkets/pdf/Building_Products_Top_Markets_Report.pdf

- In each of the report's 10 Case Study markets, there is an indication whether the respective government and private sector actors have embraced smart city development as a policy or commercial goal, and how this manifests in the market

## OMI POINT OF CONTACT

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## THE ROLE OF STANDARDS IN SMART CITIES

A range of standards is needed to help the smart city meet its potential and enable the many products and systems involved to be interoperable. Work on these standards is ongoing in a number of standards development organizations and it is important for U.S. stakeholders to be engaged since those who are at the table as the standards are written gain a competitive advantage. A good point of entry is the Network on Smart and Sustainable Cities hosted by the American National Standards Institute. The network is a forum for information sharing on standardization developments for smart and sustainable cities in the U.S. and abroad. Go to www.ansi.org/cities for more information.

# INTERNET OF THINGS (IOT)

The Department of Commerce is engaged in multiple initiatives that support the development of Smart Cities and help position U.S. businesses as leaders in the global marketplace. We are working in concert with industry and other stakeholders to develop an environment that fosters innovation.

## INTERNET OF THINGS (IOT)

IoT is the foundation for Smart Cities, which use digital technology to improve government services. As part of the Commerce Department's Digital Economy Agenda, Commerce's National Telecommunications & Information Administration (NTIA) sought input through a Request for Comment from all interested stakeholders - including private industry, researchers, academia, and civil society—on the potential benefits and challenges related to the Internet of Things (IoT) and what role, if any, the U.S. Government should play in this area. The Department intends to issue a ''green paper'' that identifies key issues impacting deployment of these technologies, highlights potential benefits and challenges, and identifies possible roles for the federal government in fostering the advancement of IoT technologies in partnership with the private sector.

The National Institute of Standards and Technology (NIST) is collaborating with US Ignite on a Global City Teams Challenge (GCTC) to bring together communities and innovators that will join forces on a range of issues from disaster response to energy management and improvements in mass transit. Internet of Things (IoT) and Cyber-Physical Systems (CPS) involve connecting smart devices and systems—in diverse sectors such as transportation, energy, manufacturing, and healthcare—in fundamentally new ways. These technologies will enable cities and communities to improve services, promote economic growth, and enhance the quality of life. With 54 percent of the world's population now living in cities, the development of "smart cities" and "smart communities" is becoming a major focus around the globe. Because many of today's smart city/community development efforts are isolated and customized projects, NIST launched the Global City Teams Challenge (GCTC) to encourage collaboration and the development of standards. The Global City Teams Challenge's long-term goal is "to establish and demonstrate replicable, scalable, and sustainable models for incubation and deployment of interoperable, standard-based IoT solutions and demonstrate their measurable benefits in Smart Communities/Cities."This program will help communities benefit from the experience of others to improve efficiency and lower costs.

## SPECTRUM

City officials are increasingly leveraging advanced digital technology to optimize and manage public assets, such as transportation systems, power plants, water supply networks, waste management, and law enforcement. For example, wireless sensors can now be deployed to collect and transmit information from almost any object – such as smart trash containers that send out alerts so that waste collectors know which ones need to be emptied. But the proliferation of sensors and wireless devices also threatens to burden existing wireless resources, requiring innovative spectrum use. Spectrum sharing technologies are therefore likely to play an increasingly important role in the success of connected infrastructure and Smart Cities.

NTIA–which has responsibility for ensuring that America's domestic and international spectrum needs are met – is working with stakeholders on novel ways to maximize spectrum resources to meet the increased demand. For example, NTIA's Institute for Telecommunication Sciences (ITS), located in Boulder, Colorado, is conducting

research, including propagation modeling and spectrum monitoring, that is integral to the science behind using spectrum more efficiently and increasing shared access to this limited resource. NTIA also is working with the Federal Communications Commission to soon launch a Model City initiative to facilitate testing and evaluation of advanced, dynamic spectrum sharing technologies and solutions in challenging urban environments. Stakeholder collaboration and engagement will be an important element in the success of this program.

## CYBERSECURITY

Digital infrastructure projects can translate into big reductions in energy used, greenhouse gases emitted, and natural resources consumed. To run smoothly, connected communities need to rely on seamless operations – yet competing architectures, standards and platforms can lead to a fragmented landscape. Governments will need to work with stakeholders to develop industry-driven solutions, such as the National Institute of Standards and Technology (NIST) Cybersecurity Framework.

NIST's voluntary risk-based framework was developed through an international partnership of small and large organizations, including owners and operators of critical infrastructure. The Cybersecurity Framework provides voluntary guidance, based on existing standards, guidelines, and practices, for critical infrastructure organizations to better manage and reduce cybersecurity risk. In addition to helping organizations manage and reduce risks, it was designed to foster risk and cybersecurity management communications amongst both internal and external organizational stakeholders. The Framework will help an organization to better understand, manage, and reduce its cybersecurity risks. It will assist in determining which activities are most important to assure critical operations and service delivery. In turn, that will help to prioritize investments and maximize the impact of each dollar spent on cybersecurity. By providing a common language to address cybersecurity risk management, it is especially helpful in communicating inside and outside the organization. That includes improving communications, awareness, and understanding between and among IT, planning, and operating units, as well as senior executives of organizations. Organizations also can readily use the Framework to communicate current or desired cybersecurity posture between a buyer or supplier.

## PUBLIC-PRIVATE PARTNERSHIPS

Forward-looking cities around the globe are increasingly entering into public-private partnerships as a way to finance infrastructure projects and outfit cities with smart technology. Private sector companies provide a range of services, from technical assistance and capacity building to logistical planning and information and communication technology (ICT) services. NTIA has released several publications that cover topics such as forming productive public-private partnerships and planning an effective community broadband roadmap. Upcoming toolkits will further explore the formation of broadband partnerships and address how to implement infrastructure projects and sustain broadband networks.

## INTERNATIONAL ENGAGEMENT

NTIA is the Executive Branch agency responsible for developing international information and communications technology policy. In that capacity, NTIA monitors and engages with foreign jurisdictions, standards organizations, and intergovernmental bodies as part of the U.S. government's ongoing effort to encourage innovation and growth of the digital economy. These efforts include the development of standards, specifications, and best practices for Smart Cities.

# UPCOMING *SMART* EVENTS

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| July 1, 2016 | Jaipur, India | Smart Cities Workshop, Jaipur (with Govt of Rajasthan) 2016 | Smart Cities Council India along with Government of Rajasthan is hosting Smart Cities Workshop – a workshop on Revenue Generation and Procurement to catalyze revenue generation and procurement process for the smart cities for Government of Rajasthan and further accelerating the livability, workability and sustainability of the cities. |
| July 5-6, 2016 | Seattle, WA, USA | Unlikely Allies 2016 – Future of Cities Festival & City Solutions Lab | Inside this laboratory, we will explore local and global solutions and exchange best practices from 80+ cities to inspire new collaborative initiatives that ar globally applicable. 400+ global and local thought leaders, change-makers, inspired citizens and their unlikely allies, policy makers, innovators, technology visionaries, artists, activists, hackers and designers will be there. |
| July 6-8, 2016 | Copenhagen, Denmark | Global Smart City Conference | Greater Copenhagen Smart Solutions offers a firsthand experience and understanding of Living Labs as a method to create smarter and more liveable cites as well as an understanding of how the digital infrastructure creates great potential for a variety of smart solutions connecting people to the city. |
| July 7-9, 2016 | Lina, Peru | Tecnoagro Peru | Purpose is to publicize business opportunities for applying technological solutions to the agricultural sector. |
| July 13, 2016 | Singapore, Malaysia | World Smart City Forum | The World Smart City Forum (#World SmartCity2016) will explore how interconnection can be accomplished. It will point to tools which are already available to help cities reach their objectives faster, more efficiently and with better outcomes. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| July 14, 2016 | Webinar | Prioritizing Resiliency | Take a deep dive into how to leverage PEER®, Performance Excellence in Electricity Renewal, to build a reliable and resilient electricity delivery system that protects critical infrastructure by joining a webinar that will provide an overview of how PEER® uses metrics and standards to define elements of energy resiliency. |
| July 21, 2016 | Hinterstoder, Austria | Landinger Sommer – Smart Cities 2016 | With the Federal Ministry for transport, innovation and technology as a partner, together with experts from a wide range of topics the "innovation engine city" for a day of discussion in the Centre. |
| July 22, 2016 | Mumbai, India | Efficient Buildings Summit 2016 | Efficient Buildings Summit 2016 is a definitive platform for you to connect with the who's who of the industry and plant the brand in the minds of key decision makers from both public & private sector converged under one roof. |
| July 26-28, 2016 | Johannesburg, South Africa | Green Building Convention | The Green Building Convention has become the icon for green progress in the South African property industry, and an energetic platform for ideas, collaboration, partnership and learning. It's where the principles and passions of the green building community are galvanized, and grow. The Green Building Convention 2016 will unify powerful voices by a shared purpose to 'Build a Better World NOW'. |
| July 29-31, 2016 | Beijing, China | China Smarter Cities International Expo | CSCE is designed to promote the healthy development of smart cities through innovation, involving nearly 300 exhibitors including smart cities, communities and enterprises related at home and abroad. |
| August 11, 2016 | Mumbai, India | 11th Construction World Architect & Builder Awards 2016 | The Construction World Architect and Builder Awards were instituted by ASAPP Info Global Group in 2006. They are India's most coveted awards for the architecture and building industry. |
| August 13, 2016 | Lima, Peru | The Renewable Energy Congress for Mining | Meeting to discuss how remote technology and renewable energy can help lower costs for mining operations. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| August 15-17, 2017 | San Diego, CA, USA | Waste Conversion Technology Conference and Trade Show | The Waste Conversion Technology Conference & Trade Show (WCTC) provides a forum for informing the public and private sectors of the economic and environmental significance of converting waste materials to alternative fuels such as biodiesel and ethanol as well as renewable electric energy. |
| August 21-26, 2016 | Pacific Grove, CA, 2016 | Summer Study on Energy Efficiency and Buildings | This ACEEE conference will feature professionals from around the world gathering to discuss reducing energy use in buildings and the climate impacts associated with buildings. |
| August 25-28, 2016 | Lima, Peru | Expo Energy Efficiency | The show aims to be a meeting place for companies linked to the renewable energy sector. |
| September 7-9, 2016 | Santiago, Chile | Trade Winds Latin America | Hosted in Chile, Trade Winds will feature a Latin America business forum, consisting of regional and industry specific conference sessions as well as pre-arranged consultations with senior U.S. diplomats representing commercial markets from 22 Western Hemisphere countries. |
| September 7-9, 2016 | Osaka, Japan | World Smart Energy Week | Comprehensive smart energy show, best platform to expand business, and a conference let by industry professionals. |
| September 7-9, 2016 | Greater Noida, India | Renewable Energy India Expo 2016 | The show aims to upscale and mainstream the applications of renewable energy resources, showcase innovations, and enrich deliberations by providing the industry with an international exhibition and conference platform. |
| September 12-15, 2016 | Denver, CO, USA | Building Vibrancy – From the Neighborhood, Up | The summit will include plenaries, mobile tours showcasing Denver's emerging innovation, hands-on studio sessions with leading experts, our unique Urban Block Party and collaborative networking experiences to discover how cities worldwide are leveraging the power of the neighborhood- and district scale to build the vibrant cities of tomorrow. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| September 12-16, 2016 | Vancouver, Canada | Pro Walk Pro Bike Pro Place | Our breakout sessions, panel discussions, and poster sessions address the latest trends, research, and best practices. Plenary speakers bring perspectives from other disciplines, and other experiences to help improve and expand our practice. |
| September 15-16, 2016 | Miami, FL, USA | LatAm Leaders Forum | With the theme of Building a New Road Map for Sustainable Growth, will bring together an exclusive group of leaders, executives and entrepreneurs, from public and private sectors, to discuss the new world Latin America faces and how it can adopt a path of innovation to remain competitive and continue to define the path of sustainable growth for the region. Smart Cities Council Executive Director Philip Bane will speak during a panel on Continental Cities. |
| September 26-27, 2016 | Abu Dhabi, UAE | Middle East Smart Lighting & Energy Summit | The biggest lighting and energy summit in the Middle East is back for its 5th year! Taking place on 26-27 September at Jumeirah at Etihad Towers, Abu Dhabi, the summit provides a forum for over 400 lighting consultants and engineers from electric utilities, municipalities, cooperatives, energy service companies across the Middle East to discuss the advancements in lighting technology, lighting applications, controls and benchmarks. |
| September 27-29, 2016 | Washington, D.C., USA | Smart Cities Week 2016 | Smart Cities Week is a highly interactive conference and expo that showcases cutting-edge technologies, real-world solutions and proven strategies government leaders need to build more livable, workable, sustainable cities. |
| September 27-29, 2016 | Dubai, UAE | GCC Municipalities & Smart Cities Conference | The conference will cover areas like Modern Management and Leadership, IT and e-Government, Information and Communication Technology, Digital Archives, Customer Care Services, Education and Knowledge Management, Sports, Stock Market, Media and Public Relations and many more. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| September 27-30, 2016 | Mumbai, India | IFAT India 2016 | The 4th Edition of IFAT India scheduled from September 28 – 30, 2016 at Hall 5, Bombay Exhibition Centre (BEC), Mumbai, India. The show will provide opportunities to the attendees to display their products and technologies in front of potential customers and to meet with key decision makers and partners. |
| September 29-30, 2016 | Craiova, Romania | Smart Cities of Romania | The regional conference and exhibition "SMART CITIES OF ROMANIA 2016 – OLTENIA" will take place on September 29th & 30th, 2016 in Craiova. |
| October 2016 (TBD) | Johannesburg, South Africa | Smart Cities Africa | Conference will consist of multiple conference sessions, business meetings & product/service showcases, and a smart pitch day program. |
| October 2016 (TBD) | Bucharest, Romania | Romanian Energy Efficiency Forum 2016 (TBC) | The Romanian Energy Efficiency Forum 2016 is a perfect networking platform that will create new ventures and investment opportunities in the area of sustainable and energy efficient program development in a crucial moment for the implementation of the 2012/27/EU Directive to Energy Efficiency. |
| October 2016 (TBD) | Belgrade, Serbia | Smart City Forum | Significant efficiency improvements will happen when city systems are both physically and virtually connected. This is easier said than done; most such systems have been designed and installed by different suppliers. The World Smart City Forum (#WorldSmartCity2016) will explore how interconnection can be accomplished. It will point to tools which are already available to help cities reach their objectives faster, more efficiently and with better outcomes. |
| October 2-11, 2016 | Kampala, Uganda | International Trade Fair | Uganda International Trade Fair is an event being held at the Lugogo Exhibition Center in Kampala, Uganda. This event showcases product from Hand, Machine & Garden Tools, Home Furnishings & Home Textiles, Architecture & Designing, Real Estate Agents, Household Services industries. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| October 5-6, 2016 | Ankara, Turkey | WICS – World Intelligent Summit & Exhibition | Annual World Intelligent Cities Summit and Exhibition will once again gather together city leaders, Government officials, academics, urban service providers and city development experts to share experiences, smart thinking and best practice for implementing the smart cities of tomorrow. WICS is an international platform for the transfer of knowledge, allowing leaders of municipalities to learn from the pioneers of smart city concepts and technologies. The event is unparalleled in the region for its peer-to-peer learning experience and excellent networking opportunities, aiding leaders and key stakeholders of municipalities to develop a secure and robust infrastructure that is fit for purpose for all citizens and achieves a more sustainable future. |
| October 6-7, 2016 | Madrid, Spain | International Open Data Conference | Participants in the International Open Data Conference will work together to set patterns and establish global open data collaboration policies that allow for wider social and economic development. |
| October 13-16, 2016 | Istanbul, Turkey | SBE16 – The Sustainable Built Environment Conference | This event aims to bring construction material producers, scientists, practitioners, architects, engineers, constructors, industry, governmental and non-governmental institutions, civil society, dealing with various aspects of Sustainable, Green, Resilient and SMART buildings, cities and Metropoles to discuss, share and exchange ideas, solutions, methods and techniques for a better future. |
| October 16-20, 2016 | Dubai, UAE | GITEX | As well as defining the latest trends, presenting high caliber speakers and showcasing product innovations from across the world, this year, GITEX is bringing together the most innovative, exciting and ambitious tech startups to showcase their world changing ideas to an audience of hand-picked international investors. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| October 17-19, 2016 | Tampere, Finland | International Mindtrek Conference/ Smart City Event | The event is organized as a part of the annual, international Mindtrek conference and will be continuing the discussions that started in the Smart City Seminar 2015 in Oulu. The prior seminar in Oulu brought together around 300 like-minded people interested in smarter cities, and with the addition of the 20th international Mindtrek conference, also held in the same venue this year, we are expecting the total number of participants to climb closer to 1000 people in three days. |
| October 18-19, 2016 | Kuala Kumpur, Malaysia | Smart Cities Asia 2016 | Smart Cities Asia will be structured around seven main themes:<br>• **Smart Development:** Building for a Greater Generation<br>• **Smart ICT:** City Beyond Technology<br>• **Smart Mobility:** Moving Fast Forward<br>• **Smart Citizens:** Integrating the People<br>• **Smart Energy:** Transformation Towards Efficient Energy<br>• **Smart Water Management:** Shaping The Future of Water<br>• **Smart Waste Management:** Adopting Sustainable Practices |
| October 18-19, 2016 | Stockholm, Sweden | World Green Building Congress | Building Sustainability SGBC16 with WorldGBC Congress Sweden brings together everyone working with sustainability in real estate, architecture, construction and urban planning. This year's conference addresses how the built environment can actively contribute to sustainable living and a more stable climate. You can take advantage of the latest in green certifications, indoors environment and health, sustainable real estate management and smart new technology for environmental adaptation. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| October 19-21, 2016 | Bologna, Italy | Smart City Exhibition 2016 | Smart City Exhibition, based on the extensive network FORUM PA relational and experience in building leading events of BOLOGNAFIERE, Italian and European place where the most advanced realities of urban life and communications, proposing a model of highly interactive involvement centered not only on activities of awareness, but on tight moments in order to influence public opinion and strategic decisions at local and Central. |
| October 19-21, 2016 | Mumbai, India | Intersolar India 2016 | India's largest exhibition and conference for the solar industry |
| October 19-22, 2016 | Puerto Montt, Chile | Aquasur | A trade show focused on agriculture and the fishing industry. |
| October 20-21, 2016 | Santa Clara, CA, 2016 | IoT Tech Expo North America | The Expo will bring together key industries from across America for two days of discussion on the Internet of Things and related technological advancements. |
| October 25-27, 2016 | Barcelona, Spain | IOT Solutions World Congress | After its very first edition, the IOT Solutions World Congress has already established itself as the leading global event focusing on industrial IOT. IOT Solutions World Congress 2016 will be the second edition of this global event dedicated exclusively to joining IoT providers with industry in order to help the latter increase productivity via this disruptive technology - See more at: http://www.iotsworldcongress.com/event/the-event/#sthash.2q1zgicD.dpuf |
| November 1-3, 2016 | Chicago, Illinois | Discover Global Markets: Building Smart Cities | For details see back cover |
| November 2016 (TBD) | Zagreb, Croatia | Smart Cities Conference: Implementation of Smart City Project | The general aim of the Smart Cities project is to create an innovation network between governments and academic partners leading to excellence in the domain of the development and take-up of e-services, setting a new baseline for e-service delivery in the whole North Sea region. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| November 1-2, 2016 | Buenos Aires, Argentina | Congreso de Ciudades Inteligents, Innovadoras, y Humanas | Argentina's first annual celebration of the event. |
| November 1-3, 2016 | Serpong & Tangerand, Banten, Indonesia (near Jakarta) | Smart Cities Indonesia Expo 2016 | This event is expected to bring together business players, government officials, policy, decision makers, community leaders, smart city planners and developers, those all related stakeholders will converge |
| November 7-8, 2016 | Mannheim, Germany | VDE-Kongress 2016 | On the VDE Congress 2016 "Internet of Things" are the two planes "applications" and "technologies" discussed in width and set in relation to each other. This should be worked out solutions, ideas and opportunities for Germany. |
| November 8-9, 2016 | Paris, France | Intelligent Building Systems and Smart Grid-Smart City | SALON CITY AND TERRITORIES INTELLIGENT, SUSTAINABLE AND CONNECTED |
| November 8-9, 2016 | Dubai, UAE | Arab Future Cities Summit | The 3rd Annual Arab Future Cities Summit 2016 will be held on 8th and 9th November at the iconic Palazzo Versace, Dubai. Ranked as one of the most innovative cities in the world and set to become the 'smartest' city, the Dubai Government has identified six key components - transport, communications, infrastructure, electricity, economic services and urban planning that are integral to smart city development. |
| November 9-10, 2016 | Budapest, Hungary | Urbania21 | The event will continue in the State, local governments, science, the economy and the civil sphere is based on the places védnökeivel, professional partners, URBANIA21 supporters along the main developed témacsoportok in 2014. |
| November 9-11, 2016 | Antofagasta, Chile | IFT Energy | A trade show focused on energy, including renewable energy and energy solutions for the mining sector. |
| November 14-18, 2016 | Vancouver, Canada | 1st Canadian German Conference on Smart Cities | From November 14-18, 2016, a German business delegation will be visiting Vancouver in order to determine the market potential for their proven technologies for smart cities and establish new business contacts. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| November 15-17, 2016 | Barcelona, Spain | Smart Cities World Expo 2016 | Smart City Expo World Congress (SCEWC) is the international summit of discussion about the link between urban reality and technological revolution. Since its first edition in 2011, it has succeeded to become a referential global event to support the development of our cities. This professional, institutional and social meeting point is a leading platform of ideas, networking, experiences and international business deals that gathers together the highest level of stakeholders, in the context of urban development. |
| November 15-17, 2016 | Barcelona, Spain | European Utility Week | European Utility Week brings together 12.000 of Europe's thought leaders and visionaries behind the world's most successful utilities and solution providers. This is a unique opportunity to showcase your brand and services as one of the leading companies in the global smart energy market. |
| November 15-17, 2016 | Cape Town, South Africa | AfriCom 2016 | AfriCom 2016 will be a week-long festival of thought-provoking content, immersive satellite events, fun new social activities, and unique networking experiences. |
| November 16-18, 2016 | Concepcion, Chile | COMAD 2016 | A Sustainable Wood Construction Technology trade show. |
| November 22-23, 2016 | Bucharest, Romania | Smart Cities of Romania 2016 | Smart City Forum is a response to the transformation, which takes place on a global scale, relating to the construction and operation of intelligent cities. It affects multiple aspects of life, ranging from transport, through ecology, energy, construction and finally new ways of communication with residents. Challenges in those areas are manifold and require a thorough and factual analysis. |
| November 29 – December 2, 2016 | Vina del Mar, Chile | Expo Naval | A Naval and Maritime trade show. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| December 2016 (TBD) | Brno, Czech Republic | Smart City Brno | Smart City Forum is a response to the transformation, which takes place on a global scale, relating to the construction and operation of intelligent cities. It affects multiple aspects of life, ranging from transport, through ecology, energy, construction and finally new ways of communication with residents. Challenges in those areas are manifold and require a thorough and factual analysis. |
| December 4-6, 2016 | Austin, TX, USA | ACEEE Intelligent Efficiency Conference | The conference will bring together thought leaders and innovators in energy efficiency and technology to discuss evolving markets, work on new policies and efficiency program strategies and explore new opportunities for energy savings. |
| December 8, 2016 | Eindhoven, The Netherlands | Intelligent Sensor Networks Conference | Three main subjects: smart infrastructure, smart industry and smart logistics. |
| January 23-24, 2017 | London, UK | IOT Tech Expo Global | The Expo will bring together key industries from across America for two days of discussion on the Internet of Things and related technological advancements. |
| February 2017 (TBD) | Warsaw, Poland | Smart City Forum | Smart City Forum is a response to the transformation, which takes place on a global scale, relating to the construction and operation of intelligent cities. It affects multiple aspects of life, ranging from transport, through ecology, energy, construction and finally new ways of communication with residents. Challenges in those areas are manifold and require a thorough and factual analysis. |
| February 1-2, 2016 | London, UK | Smart Cities UK | Smart City Forum is a response to the transformation, which takes place on a global scale, relating to the construction and operation of intelligent cities. It affects multiple aspects of life, ranging from transport, through ecology, energy, construction and finally new ways of communication with residents. Challenges in those areas are manifold and require a thorough and factual analysis. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| February 16-19, 2017 | Vienna, Austria | Bauen & Energie Wien and Aquatherm Vienna (combined) | The trade fair for building, renovation, financing and energy savings boasts a strong focus on environmental and climate protection innovations. It is a very popular annual gathering for trade specialists and for consumers intending to build new houses and extensions with the best and very latest materials and systems the industry can offer. |
| March 2017 (TBD) | Singapore, Malaysia | Internet of Things Asia | At the multi-track conference, delegates from all over the world gained key insights from more than 100 international speakers who shared real cases and challenges faced by practitioners in the field. The sheer breadth of speakers, topics and nationalities at this year's conference represented a rich cross section of the major activities going on in the world of IoT. |
| March 2017 (TBD) | Zagreb, Croatia | Smart Government Conference: Disruptive Innovations through Smart Solutions | Smart Government is an administration that applies the integrated information, communication and technology for operational planning, management and operations across multiple domains, or a set of business processes and basic IT skills that allow the flow of information across government agencies and programs to provide high quality services to citizens in all areas of activities of the Government. This should create a modern government that would openly embrace the new possibilities of technology and civic engagement, and to constantly adapt to influence for the better the results. |
| March 2017 (TBD) | Warsaw, Poland | Polish Regional Congress SMART CITY Principles and Perspectives 2017 | We are a team with rich experience in the Organization of various business events. In this, we have both smaller training, but also conferences, congresses and trade fairs. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| March 2017 (TBD) | Gdansk, Poland | Smart Metropolia Congress | For us the first day of the 4th edition of the International Congress of SMART METROPOLIS, which this year takes place under the slogan "leisure Metropolis", reminiscent of one of the key projects of the European Union – Smart Cities and which is a response to the need for a discussion about the adaptation of modern cities to changing living conditions. |
| March 2017 | Lisboa, Portugal | Green Business Week | The Green Business Week is a booster event of economic growth, skilled and sustainable employment, science and research, technology, innovation and entrepreneurship, leveraged by the growth in the world of the Green Economy, which records values above 4% per year. |
| March 1-3, 2017 | Wels, Austria | Word Sustainable Energy Days 2017 | The World Sustainable Energy Days (WSED), one of Europe's largest annual conferences in this field, offered a unique combination of events on sustainable energy. The 2016 conference, which was held from 24 - 26 February in Wels/Austria, attracted around 700 participants from 57 countries. |
| March 1-3, 2016 | Tokyo, Japan | World Smart Energy Week | Comprehensive smart energy show, best platform to expand business, and a conference let by industry professionals. |
| March 3-5, 2017 | Wels, Austria | Expo Energy 2017 | With about 400 exhibitors solely in the trade fair sector CONSTRUCTION the country's largest construction trade fair takes place again in 2017. |
| March 8-11, 2017 | Milan, Italy | MADE Expo | The four highly representative and integrated specialized exhibitions that take place under the MADE expo umbrella target specific visitor categories and attract new potential clients who are drawn to the enhanced cross-industry experience. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| March 23-26, 2017 | Antalya, Turkey | Antalya City Expo | 6th Antalya City Planning and Technologies Fair and Local Governments Symposium was held between the dates of 16-18 March 2017. Antalya City Expo was visited by approximately 14.280 sector professionals, including 1.500 visitors consist of Mayors, Governors, Presidents, Vice Presidents and Department Heads of government institutions, department heads and directors of the purchasing departments. |
| April 2017 (TBD) | Dubrovnik, Croatia | Smart City Start Ups Conference | The CityOS event is designed to kickstart your smart city in just a few weeks. It combines a media campaign, conference, workshops, and a 48-hour hackathon, all focused on solving the city's specific problems. We bring the most knowledgeable speakers, instructors, and relevant technology.<br><br>By the end of the final event, the city will already have its first functional applications built by its very own. |
| April 2017 (TBD) | Gdansk, Poland | Polish Regional Congress SMART CITY Principles and Perspectives 2017 | We are a team with rich experience in the Organization of various business events. In his, we have both smaller training, but also conferences, congresses and trade fairs.<br><br>Taking into account the needs of potential clients, we offer takes into account the diverse needs of sales and marketing companies and public institutions. |
| April 2017 (TBD) | London, UK | Smart Future Cities | Smart Cities UK 2017 Conference, Expo and Awards will lead the way on addressing the best practice examples on smart transformation from across Cities within the United Kingdom whilst disseminating guidance and information transformation within waste, energy, transport, security and other key smart sectors. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| April 5-7, 2017 | Sofia, Bulgaria | SEE Smart Cities Conference and Exhibition | International Expo Center |
| April 19-21, 2017 | Istanbul, Turkey | International Istanbul Smart Grid and Cities Congress | 4th meeting of Congress |
| April 24-28, 2017 | Hannover, Germany | Hannover Messe 2017 | From individual components to the complete intelligent factory, as well as topical trends such as energy efficiency, lightweight construction and additive manufacturing – at HANNOVER MESSE you'll get a complete picture of the industrial value-adding chain under one roof - in Hannover and worldwide. |
| April 26-29, 2017 | New York City, NY | Smart Cities NYC '17 | www.smartcitiesnyc.com |
| May – June 2017 (TBD) | Prague, Czech Republic | Smart City Symposium | The Smart Cities Symposium Prague 2016 aims on exchange of ideas and best practices in the field of Smart cities. It covers whole range of topics, from the system point of view, through data mining and data processing, smart grids, up to multi-agent systems and other soft computing approaches. The objective of this conference is to define the future applications for the field of smart cities. The results should be based on the theoretical backgrounds, but aim on usage of best practices for real world applications. |
| May 4-5, 2017 | Ankara, Turkey | International Smart City Congress | Smart City Forum is a response to the transformation, which takes place on a global scale, relating to the construction and operation of intelligent cities. It affects multiple aspects of life, ranging from transport, through ecology, energy, construction and finally new ways of communication with residents. Challenges in those areas are manifold and require a thorough and factual analysis. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| May 9-13, 2017 | Linz, Austria | Smart Grids Week 2017 | SMART GRIDS WEEK \| LINZ 2016 will be organized in co-operation with the Federal Ministry for Transport, Innovation and Technology, the Austrian Climate and Energy Fund and Linz AG. From 9th to 13th May 2017 national and international experts will come together in order to share the latest insights, look innovatively at the future and initiate projects. |
| May 10-13, 2017 | Vienna, Austria | Smart Automation Austria | The SMART Automation Austria is technology trade fair and focuses on factory and process automation.<br><br>The goods and services on show include everything from components to complete systems and integrated automation solutions, and cover an entire range of product areas in industrial automation.<br><br>The SMART Automation Austria is the commercial platform for the Austrian automation industry and takes place on an annual basis, alternating between Vienna Linz. It attracts around 270 exhibitors from 14 countries; many of whom are market leaders and technological pioneers. |
| May 15-17, 2017 | Montreal, Canada | Global Public Transportation Summit | Public transport is rapidly changing. In a world of increasing technologies, globalisation and new players entering the sector, we cannot afford to stand on the sidelines. We need to take an active role and "Lead the TRANSITion". |
| May 15-19, 2017 | Antofagasta, Chile | Exponor | A mining industry focused trade show. |
| June 2017 (TBD) | Wroclaw, Poland | Polish Regional Congress SMART CITY Principles and Perspectives 2017 | |
| July 16-24, 2017 | Jakarta, Bandung, and Surabaya, Indonesia | Smart City Summit Indonesia | Hosted by Global Smart City & Community Coalition. |

| Date | Location | Event | Other/Comments |
|---|---|---|---|
| October 2017 (TBD) | Krakow, Poland | Polish Regional Congress SMART CITY Principles and Perspectives 2017 | |
| October 8-11, 2017 | Izmir, Turkey | Kent Expo Urbanism and City Demands Fair | Municipality Vehicles, Urban Furniture, Perk-Garden Equipments, Treatment Equipment, Transport Systems, Sport Facility Equipment and Hardware Trade Fair |

# APPENDIX

# A, B, C, D, E

# APPENDIX A
## U.S. DEPARTMENT OF COMMERCE BUREAU

# SMART CITY ACTIVITIES

## THE BUREAU OF INDUSTRY AND SECURITY'S SMART CITY ACTIVITIES

Export controls are federal regulations that restrict the export of sensitive goods and technologies to foreign nationals or foreign countries for national security, foreign policy and nonproliferation reasons. A person or entity that exports items from the United States, employs foreign nationals, or collaborates on research and development with foreign nationals, may need to apply for an export license from the Bureau of Industry and Security (BIS). BIS licenses and regulates exports of dual-use goods and technology, which have both civilian and military applications, and some military items; it also enforces export control laws and regulations.

When will an export require a license? Whether a license is required depends on the destination/country, type of item being exported, end use of the item, and the parties involved in the transaction. High technology items or items destined for sanctioned countries such as Cuba and Syria may require a license from BIS before they are exported. For example, items such as encryption software, night vision equipment, and technology for unmanned aerial systems are all potentially covered under export control law. BIS can help exporters determine whether a license is needed through a number of tools and services.

## SMART CITY/INITIATIVES/ACTIVITIES/ PROGRAMMING

- **Information and Communication Technologies**
  - **Decision Tree Tools** – If you are an exporter, these tools can help you determine whether an item you would like to export is covered by BIS's export control regulations and if so, how to comply:
    - *Order of Review Decision Tool* -This tool helps exporters determine whether an item is captured by BIS's export control regulations. https://www.bis.doc.gov/index.php/export-control-classification-interactive-tool
    - *Specially Designed Decision Tool* - This tool helps determine whether an item is "specially designed" for military use, a technical definition that is a factor in determining whether an item is covered by BIS's export control regulations. https://www.bis.doc.gov/index.php/specially-designed-tool
    - *The Strategic Trade Authorization (STA) Tool* - Even if an export initially requires a license, there may be a "license exception." A license exception is an authorization that allows you to export or reexport, under stated conditions, items that would otherwise require a license. One license exception is License Exception Strategic Trade Authorization (STA). STA allows exports to governments of 36 U.S. allies without a license. This tool helps users determine if their item is eligible for shipment under the terms of License Exception STA. https://www.bis.doc.gov/index.php/statool
    - *De minimis & Direct Product Rules Tool* - This tool can help users determine if their non-U.S.-made item located outside the U.S. but made with

U.S. components, is subject to BIS's export control regulations. https://www.bis.doc.gov/index.php/de-minimis-direct-product-rules-decision-tool

- Exporter Counseling Services –BIS offers free consultations by phone or email with export counselors.
  - (202) 482-4811 - Outreach and Educational Services Division (located in Washington, DC)
  - (949) 660–0144 - Western Regional Office (located in Newport Beach, CA)
  - E-mail inquiries to the Export Counseling Division of the Office of Exporter Services at: ECDOEXS@bis.doc.gov

- **The Consolidated Screening List (CSL**) – This online search tool to can help determine if there are additional regulatory requirements to export to your proposed end-users. The CSL is a list of persons or businesses which the United States Government maintains restrictions on certain exports, reexports, or transfers of items. If a search of the CSL finds the proposed end-user of your export, you should contact BIS and complete additional due diligence before proceeding. http://apps.export.gov/csl-search#/csl-search

- **The BIS Data Portal** – A one-stop shop of export control data and analysis, which may be useful for state and local governments or business when determining trade trends by industry or destinations, which may assist in resource allocation decisions. The portal features statistical papers and datasets on exporter compliance, controlled trade with select countries, Export Control Reform (ECR), BIS licensing, and U.S. Defense Industrial Base analysis. http://www.bis.doc.gov/index.php/data

- **BIS Policy Guidance** – BIS publishes information to provide additional guidance on certain export categories and countries. This policy guidance includes subjects such as exports to Cuba and Iran, "deemed" exports (transfers of technology to foreign nationals in the United States and overseas), and particularly sensitive U.S.-origin items such as encryption software. http://www.bis.doc.gov/index.php/policy-guidance

- **Training Seminars for Exporters:** BIS conducts exporter training seminars throughout the United States to help exporters understand U.S. export control laws, regulations, and policies. Training sessions range from introductory level classes for those unfamiliar with export controls to specialized seminars on export compliance and specific export categories. For more information, visit https://www.bis.doc.gov/index.php/compliance-a-training/export-administration-regulations-training.

## CALENDAR OF EVENTS

https://www.bis.doc.gov/index.php/compliance-a-training/current-seminar-schedule

- July 19-20, New Orleans, LA, Complying with U.S. Export Controls
- August 3-4, Los Angeles, CA, Complying with U.S. Export Controls
- September 13-14, Silicon Valley, CA, Complying with U.S. Export Controls
- September 15, Silicon Valley, CA, Encryption Controls
- September 21, Buffalo, NY, Essentials of U.S. Export Controls
- September 22, Buffalo, NY, How to Develop an Export Management and Compliance Program

## BUREAU POINTS OF CONTACT

- Karen NiesVogel, Karen.NiesVogel@bis.doc.gov, 202-482-3811
- Kevin Stroud, Kelvin.Stroud@bis.doc.gov, 202-482-2087

# U.S. CENSUS BUREAU SMART CITY ACTIVITIES

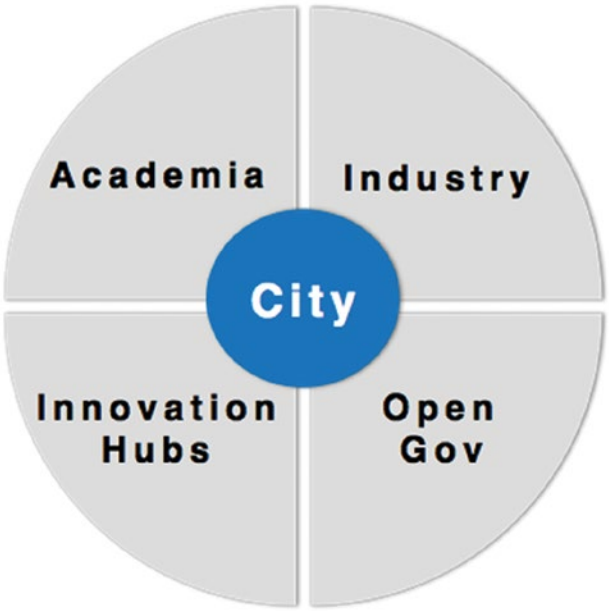
The Census Bureau's mission is to serve as the leading source of quality data about the nation's people and economy. We honor privacy, protect confidentiality, share our expertise globally, and conduct our work openly. We are guided on this mission by scientific objectivity, our strong and capable workforce, our devotion to research-based innovation, and our abiding commitment to our customers. Our goal is to provide the best mix of timeliness, relevancy, quality, and cost for the data we collect and the services we provide.

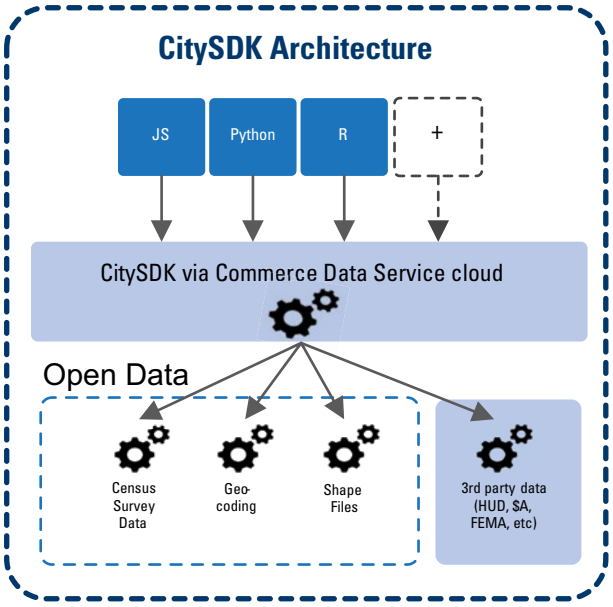
## SMART CITY INITIATIVES/ACTIVITIES/ PROGRAMMING

- The Census Bureau is the largest statistical agency in the federal government. We conduct the constitutionally mandated decennial census, the economic census, demographic surveys, the American Community Survey, Survey of Government in cities and municipalities, and many other surveys. The Census Bureau publishes the nation's open data through a number of channels to provide access to a wide audience of citizens, cities, academia, industry, developers, and innovators. The Census Bureau's data, especially when combined with other data sources, provide a unique insight about cities and communities. We assist global statistical organizations in leveraging our expertise and best practices.
- The Census Bureau promotes Smart City initiatives through the timely insights about our nation's people, demography, and economy. At the core of any Smart City initiative are data. Whether the public service requirement is about safety, energy, health, transportation, the ultimate unit of measure are people. The Census Bureau's data is foundational to assessing impact and value to individuals who collectively are members of the Smart City ecosystem.
- The Census Bureau was inspired by the European initiative in creating the first CitySDK (software development kit) and some of the first Smart City uses cases. Based on that experience, the Census Bureau developed the U.S. version of the CitySDK specifically targeted at cities and communities. Why? Open Data needs "context" and cities are the focal point for public service providers from industry, academia, entrepreneurs, and other local and federal agencies. The CitySDK provides an open source engagement platform to leverage authoritative data sources from multiple federal, local, and private sector sources.
- The Census Bureau supports all market segments of Smart City initiatives because the ultimate target or beneficiaries are people. Land use planners rely upon the American Community Survey data and that is just one of several important data sets that can be accessed from the CitySDK.
- The Census Bureau currently employs over forty data dissemination specialists across the United States who assist communities through the use of Census Bureau data. Our data scientists participate in statistical standard bodies across the globe.
- Our data and the CitySDK has given birth to important projects that are focused on cities and communities. One example of how data are applied for social good can be found at http://opportunity.census.gov.

## CENSUS BUREAU POINT(S) OF CONTACT

- Jeff Meisel, Chief Marketing Officer
U.S. Census Bureau
jeffrey.meisel@census.gov




- **Ecosystem Approach**—Open Data needs "context" and cities are the focal point for public service providers from industry, academia, entrepreneurs, and other local and federal agencies. The CitySDK provides an open source engagement platform to leverage authoritative data sources from multiple federal, local, and private sector sources.
- **Architecture**—The CitySDK abstracts the most common-use cases facing developers when combining open data and geographic boundaries. The project goal is to "just handle it" for developers. During the beta release in 2015 targeted at Javascript programmers, user research showed a reduction in the on-boarding time (for JS developers) by > 3x (from > 12 hours to < 4) when using Census data to build an application.

## ECONOMIC DEVELOPMENT ADMINISTRATION (EDA)

### SMART CITY ACTIVITIES

**BUREAU DESCRIPTION** – The Economic Development Administration's (EDA) mission is to lead the federal economic development agenda by promoting innovation and competitiveness, preparing American regions for growth and success in the worldwide economy. As the only federal government agency focused exclusively on economic development, the U.S. Department of Commerce's Economic Development Administration (EDA) plays a critical role in fostering regional economic development efforts in communities across the nation. Through strategic investments that foster job creation and attract private investment, EDA supports development in economically distressed areas of the United States.

### SMART CITY/INITIATIVES/ACTIVITIES/ PROGRAMMING

- EDA's Office of Innovation and Entrepreneurship (OIE) leads the Regional Innovation Strategies (RIS) Program competition to spur innovation capacity-building activities in regions across the nation. Through RIS, a total of $15 million in

Federal funding is available to create and expand cluster-focused proof-of-concept and commercialization programs and early-stage seed capital funds through the i6 Challenge and the Seed Fund Support (SFS) Grant competition, respectively.

  - i6 Challenge: Launched in 2010 as part of the Startup America Initiative, the i6 Challenge is a national competition based on the most impactful national models for startup creation, innovation, and commercialization.
  - Seed Fund Support Grants: These cluster grants provide funding for technical assistance to support feasibility, planning, formation, or launch of cluster-based seed capital funds that are offered to innovation-based, growth-oriented start-up companies in exchange for equity.

- EDA's Investing in Manufacturing Communities Partnership (IMCP) program is an initiative designed to revolutionize the way federal agencies leverage economic development funds. It encourages communities to develop comprehensive economic development strategies that will strengthen their competitive edge for attracting global manufacturer and supply chain investments. IMCP coordinates federal aid to support communities' strong development plans and synchronizes grant programs across multiple departments and agencies.

### BUREAU POINT(S) OF CONTACT

- RIS: Craig Buerstatte – cbuerstatte@eda.gov
- IMCP: Julie Wenah – jwenah@eda.gov

## INTERNATIONAL TRADE ADMINISTRATION (ITA) SMART CITY ACTIVITIES

The International Trade Administration (ITA) strengthens the competitiveness of U.S. industry, promotes trade and investment, and ensures fair trade through the rigorous enforcement of our trade laws and agreements. ITA works to improve the global business environment and helps U.S. organizations compete at home and abroad through focused policies and programs of its three departments, Enforcement & Compliance, Global Markets and Industry & Analysis.

### SMART CITY/INITIATIVES/ ACTIVITIES/PROGRAMMING

#### GLOBAL MARKETS (GM)

- Cities, regions and communities around the world that plan to build 'smart' infrastructure provide a significant opportunity for Global Markets (GM) teams to amplify assistance for U.S. businesses seeking to leverage the integrated and long-term project initiatives such infrastructure involves. The term "smart city" was coined in the early 1990s to illustrate how new urban developments increasingly incorporated technology, innovation, and globalization to meet the demands of citizens and businesses, and to become more efficient and cost effective. Cities around the world dedicated resources reinventing neighborhoods to become 'smarter,' and breaking ground on wholly new urban development sites, planned as smart cities. Core sectors in smart city development include: (1) Energy/Utilities, (2) Transport, (3) Water and (4) Information and Communication Technologies (ICT).
- Recent years have witnessed a global surge in the announcement of smart city initiatives by a myriad of foreign governments. Since 2014, GM teams have assisted U.S. companies with varied interests in these projects around the world.
- In one notable case, in September 2014, during a visit of Indian Prime Minister Narendra Modi to Washington, DC, President Obama announced a coordinated effort by U.S. businesses and the U.S. government to assist in the development of three of India's planned smart cities – Ajmer, Allahabad, and Visakhapatnam (Vizag). The U.S. & Foreign Commercial Service (CS) New Delhi spearheaded this work, bringing the U.S.

private sector together through multipliers, including the U.S. – India Business Council and the American Chamber of Commerce in New Delhi, along with U.S. Government inter-agency partners, including USTDA, USAID, the Department of State, and others. This effort has helped lead to early success in Vizag, where three U.S. companies (AECOM, IBM, and KPMG) have been awarded master planning contracts. CS New Delhi continues its work to support U.S. exporters pursuing opportunities in these three cities, and others across India.

- Other GM teams have also engaged key stakeholders and U.S. Government partners in support of U.S. business. CS Europe has been extremely active connecting U.S. companies with numerous government initiatives and has created a best practice document – the CS Europe Smart City Resource Guide – that was showcased at the Barcelona Smart City Expo 2015.

## INDUSTRY & ANALYSIS

- I&A's staff of industry, trade and economic analysts devise and implement international trade, investment, and export promotion strategies that strengthen the global competitiveness of U.S. industries. These initiatives unlock export and investment opportunities for U.S. businesses by combining in-depth quantitative and qualitative analysis with ITA's industry relationships.
- I&A does this by representing the interests of U.S. industry in trade negotiations, advocating on behalf of industry with foreign governments, publishing research on global opportunities for U.S. industry, and executing export promotion programs. Their efforts ensure that foreign markets are open for U.S. industry, and help guide U.S. businesses toward the best export markets for their products and services. Industry & Analysis also seeks opportunities to enter into strategic public private partnerships with companies and non-profit associations to achieve mutual export and competitiveness objectives.
- I&A's *Top Markets Series* is meant to help exporters determine their next export market by comparing opportunities across borders. Each report ranks *future* export opportunities within a particular industry based on a sector-specific methodology, **some of which would be useful resources for U.S. exporters of Smart City technologies**. The reports provide a detailed assessment of the competitiveness landscape within a sector, as well as the opportunities and challenges facing U.S. exporters in key markets. Each report is available for download.
- I&A's industry and trade policy experts have worked with others in ITA to develop various Smart City programs and events, such as recent trade missions to China and India, recruiting foreign cities to participate in a collaborative smart city program led by NIST, and advocating for international cooperation in bilateral dialogues.
- I&A defines smart cities as urban centers in which information and communication technology (ICT) provide insight and control over the various systems to improve the quality of life for residents.
- As a cross-cutting concept involving sectors as diverse as information and communications technology (ICT), energy and water, transportation, and building infrastructure, to name a few examples, many offices in I&A are working on efforts relevant to Smart Cities:
    - The Office of Health and Information Technology (OHIT) is dedicated to strengthening the global competitiveness of the U.S. health and information technology (IT) industries, by expanding their access to foreign markets and increasing U.S. exports.
        - OHIT monitors business and economic trends in the ICT hardware common in many Smart City projects, including sensors, communications and network equipment, and computers. Our experts also cover health information technology, which is a growing sub-sector of Smart Cities.

- The Office of Digital Services Industries within I&A closely follows major ICT policy issues relevant to Smart Cities, including digital data flows through advancing the development of the European Union – U.S. Privacy Shield initiative. This office also engages on issues related to data localization and cybersecurity.
- From a transportation standpoint, I&A's Office of Transportation and Machinery forecasts opportunities for U.S. companies in long-term commercial endeavors to make their transportation infrastructure more efficient. Intelligent transportation systems (ITS) and improved data and connectivity within transportation systems are two pathways for U.S. companies to become engaged in this space globally.
    - ITA/I&A will continue to foster relationships with industry associations within the smart transportation sector, as well as attend shows & conferences that have a smart city/transportation focus.
    - ITA will also continue to collaborate across agencies/offices, such as the Federal Transit Administration, the Intelligent Transportation Systems Joint Program Office, and NIST to work together to determine best practices on research & development, market intelligence and market entry strategies globally.
- I&A's Office of Energy and Environmental Industries looks at global market opportunities in the smart grid and smart water sectors.
    - U.S. suppliers of smart grid technologies will find global opportunities in both Greenfield and brownfield city efforts.
    - These exports leverage U.S. investments to upgrade the domestic electric grid and capitalize on the growing global market.
    - Smart water speaks to the deployment of ICT technologies to manage the efficient treatment, distribution, storage, use, reuse, and billing of water and wastewater resources on the macro (public treatment and distribution network), meso (industrial and building level networks), and micro (household) scale within a network.
- I&A's Office of Materials Industries covers U.S. exports focused on building materials and building products. Within these two sectors, I&A looks at opportunities for U.S. companies in intelligent or 'smart' buildings and 'smart' street lighting in cities.
- The 2016 Top Markets Building Products and Sustainable Construction report indicates "smart cities" are a trend in sustainable construction that may create opportunities for U.S. exporters of building products that are energy efficient and interoperable with relevant intelligent building systems.

## UPCOMING EVENTS

- **Discover Global Markets:** *Building Smarter Cities* will be held November 1-3, 2016, in Chicago, IL

  This event will focus on the latest innovations and commercialization trends in global smart cities and the Internet of Things (IoT), as well as purchasing patterns and export strategies around the world. This program will highlight investments in infrastructure needed to support smart city development, the growth of the IoT, technology-powered sustainability, and cyber security. Featured speakers will include international business leaders, visiting U.S. commercial diplomats from more than twenty countries, high-level government officials, and seasoned exporters. ITA is drafting a schedule request for the Secretary to keynote the event.

- **U.S. Commercial Service** teams are leading or collaborating on over 100+ international events around the world over the next 12 months; details are listed in the *Upcoming Smart Events* section.
- Smart Cities Week
  September 27-29, 2016 / Washington, DC
- Power-GEN Asia; Seoul, Korea,
  September 20-22, 2016
- European Utility Week; Barcelona, Spain,
  November 15-17, 2016
- Discover Global Markets: Building Smart Cities,
  November 1-3, 2016, Chicago, IL
- Consumer Electronics Show,
  January 5-8, 2017, Las Vegas, NV
- 23rd World Congress on Intelligent Transportation Systems,
  October 10-14, 2016 / Melbourne, Australia
- 25th International Technical Conference on the Enhanced Safety of Vehicles,
  June 5-8, 2017 / Detroit, Michigan
- 24th World Congress on Intelligent Transportation Systems,
  October 29 – November 2, 2017 / Montreal, Canada

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## NATIONAL INSTITUTE OF STANDARDS & TECHNOLOGY (NIST) SMART CITY ACTIVITIES

### BUREAU DESCRIPTION

NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.

### NIST SMART CITY PROGRAMS

**Global City Teams Challenge** – The *Global City Teams Challenge* (GCTC) encourages collaboration and the sharing of ideas and best practices by bringing together two key groups—communities with challenges and innovators with the technology to overcome them. The second round of GCTC was announced in September 2015 at the White House Smart Cities Forum. The new challenge will bring communities and innovators together to encourage collaboration on a range of issues from disaster response to energy management to mass transit improvement. The goal is to help communities and businesses connect to improve resource management and quality of life by using effective networking of computer systems and physical devices, often called the Internet of Things.

NIST's partners in the Global City Teams Challenge include:

- Federal Partners - the National Science Foundation; the International Trade Administration; the U.S. Departments of Transportation and State; General Services Administration, Census, the National Telecommunications and Information Administration, and the Networking and Information Technology Research and Development (NITRD) Program
- Private Sector – AT&T, GE, IBM and Intel
- Non-Profits – US Ignite, WeGO, FIWARE, the Industrial Internet Consortium, MetroLab Network, R20, USGBC, PTI, and ICMA

The current round of the Challenge extends through June 2017 and includes more than 120 cities and communities from across the US, Europe, Asia, and Africa working with more than 300 companies, universities, and non-profit organizations in over 100 project teams. These teams are working on smart city solutions that are replicable and scalable across multiple cities and infrastructures and that provide measurable benefits to residents. Current GCTC projects are in areas ranging from intelligent transportation and smart grid to health care, community resilience, citizen services, public safety, environmental quality and more. The Challenge is open to participation by all and companies and cities are welcome to join at any time by visiting the NIST GCTC web site at www.nist.gov/cps/sagc.cfm or the web site of GCTC partner, US Ignite (www.us-ignite.org/globalcityteams/). More information on the steps of joining the GCTC can be found at https://www.us-ignite.org/globalcityteams/participation-guide.

**Internet of Things-Enabled Smart City Framework** – NIST and its partners have formed a new, international public working group to develop a consensus Internet of Things-Enabled Smart City Framework (IES-City Framework, pronounced "Yes-City") that will help future communities take advantage of networked "smart" technologies to improve the lives of their residents. These smart technologies – sometimes referred to as the Internet of Things – will provide the foundation for advanced infrastructures and enable progress in fields from health care, emergency response and traffic flow management to electric power generation and delivery. The working group's goal is to analyze existing technology to discover both the harmonizing architectural principles and the vocabulary that will be necessary to create interoperable and replicable smart city solutions. The group will publish its findings as the IES-City Framework document.

The IES-City Framework project comprises an international technical working group, with partners including:

- ANSI – The American National Standards Institute
- ENEA – The Italian National agency for new technologies, Energy and sustainable economic development
- ETSI - The European Telecommunications Standards Institute
- The FIWARE Foundation
- MSIP – The Ministry of Science, ICT, and Future Planning of the Republic of Korea
- USGBC – The US Green Building Council

Participation is free and open to all by visiting the web site at pages.nist.gov/smartcitiesarchitecture/.

## SMART CITY SECTORS

NIST's Global City Teams Challenge and IES-City Framework programs encompass all smart city sectors including transportation, energy, manufacturing, environment, health, public safety, community resilience, and more. Further, ongoing NIST measurement science programs cover a wide range of technologies essential to smart cities, including networking and communications technologies, cloud computing, big data, community resilience, cybersecurity, cyber-physical systems, privacy engineering, and smart grid.

## CALENDAR OF EVENTS

- Global City Teams Challenge Fall Tech Jam, November 2016, Washington DC
- IES-City Smart City Framework workshop, November 2016, Washington DC

## BUREAU POINT(S) OF CONTACT

- Director of Cyber Physical Systems and Smart Grid Programs: Chris Greer (chris.greer@nist.gov)
- Global City Teams Challenge: Sokwoo Rhee (sokwoo.rhee@nist.gov)
- Internet of Things-Enabled Smart City Framework (IES-City Framework): Martin Burns (martin.burns@nist.gov).
- NIST Research Programs: Jason Boehm (Jason.boehm@nist.gov)

# NATIONAL TELECOMMUNICATIONS & INFORMATION ADMINISTRATION (NTIA) SMART CITY ACTIVITIES

## BUREAU DESCRIPTION

NTIA is the Executive Branch agency that is principally responsible for advising the President on telecommunications and information policy issues. NTIA's programs and policymaking focus largely on expanding broadband Internet access and adoption in America, expanding the use of spectrum by all users, and ensuring that the Internet remains an engine for continued innovation and economic growth.

## SMART CITY/INITIATIVES/ ACTIVITIES/PROGRAMMING:

### SECTOR: INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT).

- City officials are increasingly leveraging advanced digital technology to optimize and manage public assets, such as transportation systems, power plants, water supply networks, waste management, and law enforcement. Advanced digital technologies require robust broadband connections – both wireline and wireless – to deliver and interconnect services, as well as store and analyze data. NTIA works in concert with industry and other stakeholders to develop a legal and policy environment that fosters broadband deployment and increased investment. In addition, a number of specific NTIA initiatives are contributing to the advancement of Smart Cities.
- **Broadband Grant Programs.** NTIA's broadband grant programs played an important role in helping communities build next-generation infrastructure. For example, the Broadband Technology Opportunities Program (BTOP) invested $4 billion in 230 projects across the country that built critical broadband network infrastructure, opened or upgraded public computer centers, and established broadband adoption and digital inclusion programs. NTIA's State Broadband Initiative (SBI) program invested another $300 million to help states collect broadband data for the National Broadband Map and expand their statewide broadband capacity. Virtually all BTOP projects are now completed, and no more funding is available.
- **BroadbandUSA.** Armed with lessons learned and best practices from these grant programs, NTIA launched its BroadbandUSA program in January 2015 to help communities expand their broadband capacity, adoption, and use. BroadbandUSA offers technical assistance, guidance and resources to communities across the country seeking to expand local broadband deployment and adoption. As part of this effort, NTIA is convening a series of regional workshop to bring together local, state and federal officials, industry representatives, and other stakeholders to discuss the broadband challenges they face and explore possible solutions. To date, NTIA has held regional broadband workshops in Minneapolis, Minnesota; Jackson, Mississippi; Portland, Maine; Sunnyvale, California; and Seattle, Washington and is planning to host additional workshops later this year. BroadbandUSA's technical assistance team provides free hands-on, one-to-one support to local government officials and other key stakeholders on a range of broadband projects nationwide.
- **Publications.** NTIA has also released several publications that provide tips and best practices to assist communities in achieving their broadband goals. For example, BroadbandUSA publications cover topics such as forming productive public-private partnerships, planning an effective community broadband roadmap, and documenting the various federal programs that fund broadband projects. Upcoming toolkits will further explore the formation of broadband partnerships and address how to implement infrastructure projects and sustain broadband networks.
- **Broadband Opportunity Council.** NTIA also partners with other federal agencies to join efforts and combine resources. In March 2015, President Obama created the Broadband

Opportunity Council, composed of 25 federal departments and agencies, to determine what actions the federal government could take to eliminate regulatory barriers to broadband deployment and to encourage investment in broadband networks and services. The Departments of Commerce and Agriculture co-chair the Council. In September 2015, the White House released the Council's report, which describes concrete steps the member agencies will take to reduce barriers and promote broadband investment and adoption. Once implemented, these agency commitments will make a meaningful difference to communities seeking to expand and enhance their broadband capacity.

- **Community Connectivity Initiative.** As one of NTIA's commitments outlined in the Council's report, the Community Connectivity Initiative will support communities across the country with tools to help accelerate local broadband planning and deployment efforts. NTIA, in close collaboration with its partners, will create a comprehensive online assessment tool to help community leaders identify critical broadband needs and connect them with expertise and resources. The online tool will provide a framework of benchmarks and indicators on access, adoption, policy, and use for communities. NTIA is partnering with several communities and organizations to help develop the measurements for the tool and make it useful for communities. NTIA has held several workshops and webinars to educate stakeholders on the framework and tools (March 22, April 12, April 28, and May 5). NTIA will also launch a nine-part series of monthly webinars to engage stakeholders to inform the development of the community connectivity initiative beginning on July 14. Additional webinars will be held on August 11, September 8, October 13, November 12, December 8, January 12, 2017, February 9, 2017, and March 9, 2017.

- **Global City Teams Challenge.** Over the past year, NTIA has been collaborating with NIST on its Global City Teams Challenge (GCTC) initiative - a partnership between NIST and US Ignite where international teams work on collaborative deployments of Internet of Things technologies in a smart city environment. In November 2015, NTIA hosted a webinar to provide a forum for NIST to educate NTIA's community stakeholders about the GCTC. In March 2016, NTIA participated in NIST's GCTC Tech Jam workshop and disseminated information about BroadbandUSA. NTIA also plans to invite NIST to participate in its BroadbandUSA regional workshops to inform attendees about the GCTC. NTIA and NIST are exploring additional opportunities to coordinate efforts related to smart cities.

- **First Responder Network Authority (FirstNet).** In 2012, Congress created FirstNet as an independent authority within NTIA and directed it to deploy a nationwide, fully interoperable wireless broadband network for public safety. When complete, the network will offer advanced communications capabilities and applications to first responders across the country, enabling them to communicate with one another seamlessly, speeding response times and saving lives. FirstNet is currently on track in meeting its network deployment milestones. Earlier this year, it issued a Request for Proposals to select a partner to help it deploy the network and it anticipates awarding a contract later this year.

- **Spectrum Sharing.** In this era of spectrum scarcity, NTIA, including its Institute for Telecommunication Sciences, is working to increase opportunities for spectrum sharing. Collaboration with stakeholders is necessary in order to develop novel ways to maximize spectrum resources so that cities can deploy advanced services and connected devices. NTIA is partnering with the FCC on a Model City initiative to facilitate experimentation and demonstration of advanced spectrum sharing technologies in real world, urban environments. The Model City program promises to inform the development of policies, underlying technologies, and system capabilities for advanced, dynamic spectrum sharing. NTIA and the FCC have received

input from stakeholders and a number of forward-looking cities have expressed interest in participation. NTIA and the FCC are collaborating with stakeholders on next steps.

- **Internet of Things.** As part of the Commerce Department's Digital Economy Agenda, NTIA has engaged with a wide range of stakeholders—including companies, researchers, academia, and civil society—on the potential benefits and challenges related to the Internet of Things (IoT) and what role, if any, the U.S. Government should play in this area. IoT is the foundation for Smart Cities, which use digital technology to improve government services. The Department intends to issue a "green paper" that identifies key issues impacting deployment of these technologies, highlights potential benefits and challenges, and identifies possible roles for the federal government in fostering the advancement of IoT technologies in partnership with the private sector.
- **International Engagement.** NTIA monitors and engages with foreign jurisdictions, standards organizations, and intergovernmental bodies as part of the U.S. government's ongoing effort to encourage innovation and growth of the digital economy. These efforts include development of standards, specifications, and best practices for Smart Cities and the Internet of Things.

### BUREAU POINT(S) OF CONTACT

- NTIA POCs: Glenn Reynolds and Linda Kinney.

### SPECIFIC GEOGRAPHIC LOCATIONS

- To date, NTIA has held regional broadband workshops in Minneapolis, Minnesota; Jackson, Mississippi; Portland, Maine; Sunnyvale, California; and Seattle, Washington.

## U.S. PATENT & TRADEMARK OFFICE (USPTO): SMART CITY ACTIVITIES

### BUREAU DESCRIPTION – USPTO:

Fostering innovation, competitiveness and economic growth, domestically and abroad by delivering high quality and timely examination of patent and trademark applications, guiding domestic and international intellectual property policy, and delivering intellectual property information and education worldwide, with a highly-skilled, diverse workforce.

### SMART CITY/INITIATIVES/ ACTIVITIES/PROGRAMMING

- A smart city is commonly an urban development vision to integrate multiple information and communication technology (ICT) solutions in a secure fashion to manage a city's assets the city's assets include, but not limited to, (1) Energy/Utilities, (2) Transport, (3) Environmental Protection/Safety, (4) Information and Communication Technologies (ICT), (5) Governance. Governance includes administration services for residents, services to increase resident participation in decision making, and services to improve the quality of life for residents and critically, (6) innovation (based on USPTO data). All of the other assets leverage innovation to continually improve the quality of life of cities.
- We also define "smart cities" as regions since we have Regional Offices in Dallas Denver, Detroit and San Jose, CA. Their mission is primarily focused on serving and understanding through engagement this areas.
- The goal of building a smart city is to improve quality of life by *using technology* to improve the efficiency of services and meet residents' needs. Understanding and leveraging technology can best be done through USPTO data to meet the goal of creating smart cities.
- USPTO data provides early signs of meaningful R&D and if analyzed could help identify "smart city" technology/research activity (by

technical subject matter, geographic region, inventor and institution) - as well as help spot gaps, trends, and progress of smart city related technologies a key signal of where innovation is going.

- The USPTO will align our open data agency mission requirements, public needs and preferences, and available resources to make it happen. To make this effort work the USPTO will:
  - improve the discoverability, usability, and accessibility of USPTO data as it relates to smart cities
  - engage our customers to support development/usage of USPTO data and innovation that leads to business growth for cities and regions; and
  - partner with our smart cities as data customers to improve the quality of our data and to guide product development.
- The USPTO is uniquely equipped to:
  - establishing principles and strategic frameworks to guide connected device and Internet of Things (IoT) implementation,
  - USPTO can play a convening role in the identifying what IP challenges IoT companies, for example in information and communication technologies and the transportation space based on the relationships with this types of companies through our Regional Offices (Dallas Denver, Detroit and San Jose, CA) where many key players in this space are located,
  - serving as the coordinating entity for new technology and IoT deployments across all City agencies,
  - collaborating with academia and the private sector on innovative pilot projects, and partnering with municipal governments and organizations around the world to share best practices and leverage the impact of technological advancements.
- Using analytics based on USPTO data combined with other data sets (such as economic data/indicators) allows trend line(s) analysis to glean unique insights, and the USPTO can deliver on visualization tools so that better decisions are made on how to strategically invest in particular smart city/ IOT tools/technology that are most innovative. From this, key elements of "smart cities" will have better data to generate cost savings, increase impact and enhance analytics allow for increased equity in the delivery of services.
- Open Data at the USPTO derives new and sustainable ways to make our data better and provide a platform for to get data "faster and easier" with our Developer Hub.[134] The Hub provides open sourced, enhanced analytics that could increase equity in the delivery of services by visualizing USPTO data, and by combing this data with other data, such as economic data, report data on filings rates, inventorship, assignee, and location of filing to inspiring new user stories focused on "smart cities" solutions, and finally sharing in our Community Café for the public to easily access.
- Researchers, inventors and startups can quickly identify the inventive leaders in their technologies and regions, especially in understanding all the various types of "smart cities" based on their inventiveness or innovation. This foundational information can serve as a resource for research driving strategic business decisions both in the public and private sector.
- The USPTO open data initiative seeks to improve the discoverability, accessibility, and usability of public patent and trademark data though application programming interfaces (APIs). APIs power a majority of mobile applications, many IT programs, and also create a market for the private sector to develop value-added data driven products and services as well that will be a cost effective

[134] https://developer.uspto.gov

way to integrate into development and long term curation of "smart cities."

- For example, the USPTO will be contributing content from its sector experts in the Industry and Analysis business unit and 'business intelligence' from its open data and big data programs to drive evidences based policy around technology and in support of the VPOTUS Cancer Moonshot.
- Additional examples from the USPTO are Challenges and initiative involving; Census data, FDA partnership, and would like to harness new relationships with EDA's Comprehensive Economic Development Strategy program.
- The goal is to communicate more effectively with U.S. companies and communities about the resources that are available to them from across the DOC enterprise. For the USPTO, the goal is to help U.S. companies understand the technology landscape to ensure economic competitiveness enable precise and impactful funding and public policy efforts to improve the effectiveness of the commercialization lifecycle of treatments and products.

### POLICY CONTACT / EXTERNAL ENGAGEMENT CONTACT:

USPTO POC's are: Vikrum Aiyer, Chief of Staff, and alternate Thomas A. Beach, Senior Advisor, for policy and strategy discussions and leading external engagement.

### SPECIFIC GEOGRAPHIC LOCATIONS:

USPTO has Regional Offices in Dallas Denver, Detroit and San Jose, CA that primarily focus on serving and understanding through engagement these regions.

## CALENDAR OF EVENTS

- Multiple public/private engagements in based near our Regional Office (tentatively fall of 2016 and spring of 2017) based on themes such as Mobility and Open Data.

# APPENDIX B

## U.S. COMPANY CAPABILITIES

"…foreign leaders are asking for the help of American companies to fill their infrastructure needs.

In fact, I have led trade missions to Africa, the Middle East, and East Asia, bringing some of our nation's leading infrastructure and energy companies to offer their assistance and help these nations address their infrastructure challenges.

These foreign governments have come to recognize what we have long understood: that their economies not only need a sturdy and robust infrastructure, but that ***American companies can be critical providers of expertise, the latest technologies, superior engineering, and the most creative solutions to their problems."***[135]

– U.S. Secretary of Commerce Penny Pritzker

U.S. companies are in demand for smart cities and smart infrastructure development opportunities. The U.S. Department of Commerce can help by (1) increasing access these opportunities by opening markets globally and (2) strengthening fair competition in international trade for U.S. firms and workers by addressing foreign unfair trade practices and enforcing international trade agreements.

In this guide we have listed seven companies that have paid to help defray the costs of publishing this document. Yet there are thousands more, small and medium sized businesses that are increasingly becoming part of the global supply chain in the smart city and smart infrastructure space.

We look forward to expanding the number of U.S. companies we showcase and share their best practices in smart city and smart infrastructure development around the world in future versions of this guide.

[135] https://www.commerce.gov/news/secretary-speeches/2014/09/us-commerce-secretary-penny-pritzker-delivers-remarks-infrastructure

# APPENDIX C

## U.S. DEPARTMENT OF COMMERCE

### KEY POINTS OF CONTACT

**GENERAL MAILBOX:**
SmartCities@Trade.gov

**WEBSITE:**
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2. IMCP: Julie Wenah, jwenah@eda.gov

### INTERNATIONAL TRADE ADMINISTRATION (ITA)

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- For Global Markets U.S. offices find your local office at: http://export.gov/usoffices/
- For Global Markets Foreign offices, refer to individual country pages in Trade Promotion section or find the office at: http://export.gov/worldwide_us/
- Specific Industry & Analysis representatives:
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  - Matthew Hein (Health IT), Matthew.Hein@trade.gov
  - Jeffrey Williams, Smart Transportation, Jeffrey.williams@trade.gov +1.202/482.0670
  - Maureen Hinman, Smart Water, Maureen.Hinman@trade.gov
  - Vickie Gunderson, Smart Grid, Victoria.Gunderson@trade.gov
  - Joanne Littlefair, OMI (Manufacturing), Joanne.Littlefair@trade.gov +1.202/482.4855

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2. Global City Teams Challenge: Sokwoo Rhee (sokwoo.rhee@nist.gov)

3. Internet of Things-Enabled Smart City Framework (IES-City Framework): Martin Burns (martin.burns@nist.gov).
4. NIST Research Programs: Jason Boehm (Jason.boehm@nist.gov)

## NATIONAL TELECOMMUNICATIONS & INFORMATION ADMINISTRATION (NTIA)

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## U.S. PATENT AND TRADEMARK OFFICE (USPTO)

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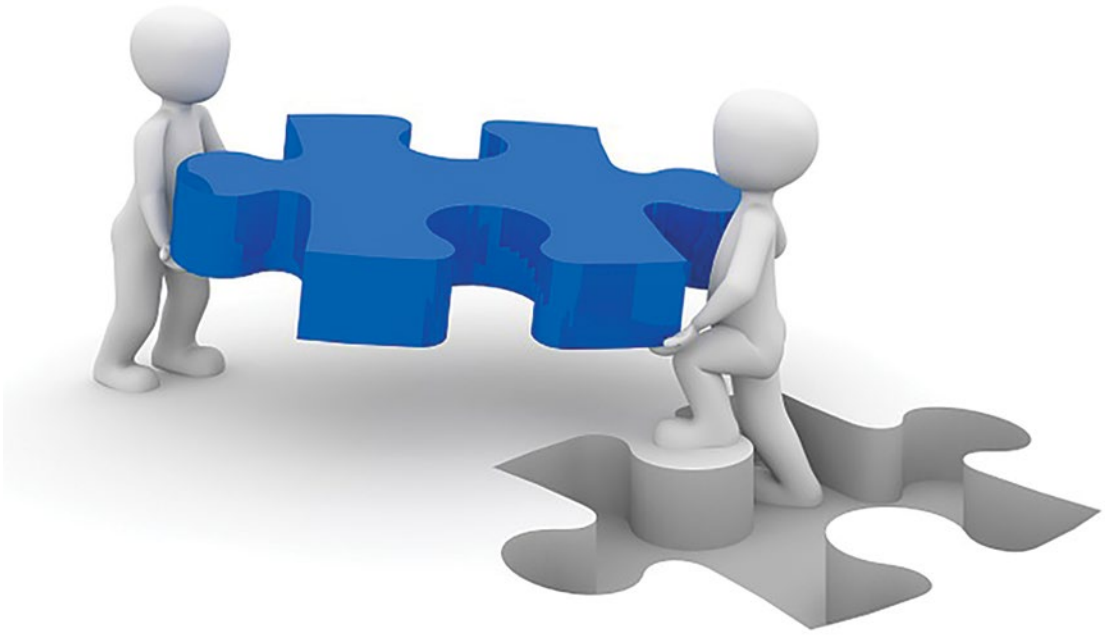
# APPENDIX D

## ADDITIONAL RESOURCES

To advance U.S. company exports, ITA collaborates and leverages information with many external organizations and advisory committees. The following pages highlight current groups with whom we are working with on various smart city initiatives.



[136] https://pixabay.com/en/puzzle-cooperation-partnership-1019847/

# What Works Cities Toolkit

## YEAR ONE HIGHLIGHTS

### What Works Cities Movement

Expanding data and evidence practice

**COMMUNITY ENGAGEMENT**

An introduction to engaging residents with data.

**CULTIVATING TALENT**

A guide to helping governments find and keep the talent necessary to accelerate the effective use of data and evidence.

**CHANGING CULTURE**

A practical guide to building a City Hall culture that's comfortable with and adept utilizing data.

**COMMUNICATIONS GOALS & SUCCESSFUL STRATEGIES**

A tip sheet of successful strategies to encourage media coverage of a city's progress and achievements with data and evidence.

**THE CITY HALL DATA GAP**

A look at current data and evidence practice in City Halls across America.

**WHAT DOES GOOD LOOK LIKE?**

Examples of city accomplishments with data and evidence throughout the U.S.

**WHAT WORKS CITIES EXPLAINER VIDEO**

An animated introduction to our work.

**WHAT WORKS CITIES SUMMIT ON TRANSFORMING DATA INTO ACTION**

Behind the scenes at the first convening of city leaders.

### Open Data Policies

**OPEN DATA "FIRESTARTER": DRAFT OPEN DATA POLICY LANGUAGE**

Language cities can use to start their open data policy discussions; here it is translated into Spanish.

**OPEN DATA POLICY RESOURCES: COMPARISON, COMPENDIUM, MAP AND GITHUB REPOSITORY**

U.S. municipal and state open data policies tracked, compiled and analyzed.

**OPEN DATA POLICY ANNOUNCEMENT MATERIALS: PRESS RELEASE TEMPLATE AND EXAMPLES**

A compendium of press releases announcing cities' newly enacted open data policies and programs and a simple press release template.

**OPEN AND COLLABORATIVE ONLINE APPROACHES TO OPEN DATA POLICY MAKING**

A brief how-to guide for sharing policy drafts online using Google Docs.

**THE SENSITIVE INFORMATION BALANCING ACT: RESPECTING PRIVACY AND ASSESSING RISK IN OPEN DATA POLICY**

Materials and resources American cities are using to address privacy concerns, assess risk, and limit liability while releasing government data online.

**KEY**

- Guides & Templates
- City Stories
- Videos


# What Works Cities Toolkit

## YEAR ONE HIGHLIGHTS

### Open Data Implementation

**OPEN DATA – GETTING STARTED**

A guide for cities interested in using open data to collaborate with constituents.

**DATASET INVENTORY GUIDELINES**

A guide to identifying and releasing high quality, valuable data sets.

**MEASURING WHAT MATTERS**

A framework and list of metrics to help cities measure the performance of their open data programs.

**WHAT WORKS CITY LEADERS EXPLAIN THEIR WORK WITH OPEN DATA:**

- Investing in open data and analytics in San José
- 'Open Information Saint Paul' Makes Data Dynamic, Relevant and User-Friendly
- Mesa embraces open data with new portal and policy

### Performance Management

**PERFORMANCE MANAGEMENT - GETTING STARTED**

A guide to setting up and launching a successful performance management program.

**BENCHMARKING**

A practical guide to help governments advance performance management practices through internal and external benchmarking.

**PERFORMANCE-BASED BUDGETING**

An intro to performance-based budgeting.

**SETTING PERFORMANCE TARGETS**

How to advance performance management practices by setting strong targets.

**PERFORMANCE ALIGNMENT**

A step-by-step guide to link cities' strategic priorities to measurable outcomes and activities.

**CITY LEADERS DESCRIBE THEIR WORK WITH PERFORMANCE MANAGEMENT**

- Infusing Government with a Data-Driven Culture
- How Las Vegas is Getting Results from Its Focus on Data-Driven Decisionmaking

# What Works Cities Toolkit

## YEAR ONE HIGHLIGHTS

### Results-Driven Contracting

**RESULTS-DRIVEN CONTRACTING: AN OVERVIEW**

An overview of results-driven contracting strategies and other best practices to improve the results of procurements and contracts.

**USING DATA TO IMPROVE THE LIVES OF CITIZENS**

A look at how Boston has used technology and data to improve the safety of firefighters, accelerate permitting, and reduce traffic congestion.

### Low Cost Evaluations

**USING BEHAVIORAL INSIGHTS TO DRIVE POSITIVE OUTCOMES IN CITIES**

How to use low cost, randomized control trials based on behavioral science to prompt residents and businesses to pay their sewer bills and parking fines, and encourage residents to see a doctor.

**STORIES FROM THE STATES**

An overview of 10 randomized control trials launched during WWC's first year in six cities from Kentucky to California – and the methodology behind the behavioral science.

**NUDGING US IN THE RIGHT DIRECTION**

A quick explanation of behavioral science.

### City Accomplishments

**WHAT OUR CITIES HAVE ACCOMPLISHED IN THEIR ENGAGEMENT WITH WHAT WORKS CITIES**

- Denton, TX
- Jackson, MS
- Kansas City, MO
- Louisville, KY
- Mesa, AZ
- New Orleans, LA
- Tacoma, WA
- Victorville, CA
- Waco, TX

**THREE CITY LEADERS DESCRIBE THEIR USE OF DATA AND EVIDENCE:**

- Kansas City, MO Mayor Sly James
- Las Vegas, NV City Manager Betsy Fretwell
- Saint Paul, MN Mayor Chris Coleman

### OUR PARTNERS

Bloomberg Philanthropies | The Behavioral Insights Team | Johns Hopkins University | GovEx | Harvard Kennedy School Government Performance Lab | Results for America | Sunlight Foundation

## 100 RESILIENT CITIES

Pioneered by the Rockefeller Foundation (100RC) is dedicated to helping cities around the world become more resilient to the physical, social, and economic challenges that are a growing part of the 21st century. 100RC supports the adoption and incorporation of a view of resilience that includes not just the shocks – such as earthquakes, floods, disease outbreaks, etc. – but also the stresses that weaken the fabric of a city on a day to day or cyclical basis.

Examples of these stresses include high unemployment; an overtaxed or inefficient public transportation system; endemic violence; or chronic food and water shortages. By addressing both the shocks and the stresses, a city can better respond to adverse events and is more capable of delivering basic functions in both good times and bad, to all populations.

Cities in the 100RC network are provided with resources along four pathways:

1. Financial and logistical guidance for establishing an innovative new position in city government, a Chief Resilience Officer (CRO), who will lead the city's resilience efforts;
2. Support for a Chief Resilience Officer to lead stakeholders in the development of a resilience-building strategy. This strategy, developed over the course of six to nine months, will serve as the city's roadmap to resilience.
3. Access to tools, service providers, and partners from the private, public, and non-profit sectors who can help cities develop and implement their resilience strategies. Current Partners include data analysis companies, reinsurance companies, architects, energy experts, and more.
4. Inclusion in the 100RC Network, through which CROs can share best practices, solve problems collectively, and learn from each other and from other resilience experts.

Through these offerings, 100RC aims to not only help individual cities become more resilient, but to facilitate the creation of a global practice of resilience building. 100RC began working with their first cohort of 32 cities in December 2013, and announced their second class of 34 cities in December 2014. In May of 2016 100RC announced their third and final cohort of cities, bringing the total number of member cities to 100, a remarkable milestone achieved in less than 3 years.

100 Resilient Cities is financially supported by The Rockefeller Foundation and managed as a sponsored project by Rockefeller Philanthropy Advisors (RPA), an independent 501(c)(3) nonprofit organization that provides governance and operational infrastructure to its sponsored projects.

www.100resilientcities.org

420 Fifth Avenue, 19th Floor | New York, NY 10018

*Approved by Committee: May 24, 2016*

## Department of Commerce's
## Renewable Energy and Energy Efficiency Advisory (REEEAC)

# SMART CITIES PRIORITY WORKSHEET

There is no standard definition of a "smart city." Definitions and uses of this term vary dramatically across the globe, which causes difficulty in developing programs and identifying opportunities for the deployment of diverse technologies that underpin the development of a smart city. That said, there are three undisputable qualities that contributes to making a city "smart": efficient, people-centric, and future-proof (resilient). The following series of questions is intended to guide decision makers and businesses in understanding the drivers for smart city development and provide insight into the technologies, sectors, and types of developments required to create a roadmap that is tailored to each unique location.

## SECTION 1: ASSESSING WHAT EXISTS

### TRANSPORTATION

**1. Is there a transportation strategy provided by the city?**

Yes: Has it been implemented?

Yes: Does the plan provide for transportation means other than private vehicles (e.g. public transit, freight mobility, walking, biking)?

Yes

No

No: What are the barriers? _____

No

### ELECTRICITY

**2. Are there any areas of the city without reliable electricity?**

Yes: What is the approximate percentage?

a. 0%-25%

b. 26%-50%

c. 51% or above

No

**3. Of those with reliable electricity access, how often are there outages?**

a. Daily

b. Weekly

c. Monthly

d. Annually

**4. What percentage of the critical infrastructure (e.g., hospitals and emergency health centers) have back-up power generation?**

a. 0%-25%

b. 26%-50%

c. 51%-75%

d. 76%-100%

**5. What is (are) the main* source(s) of your electricity? Check all that apply. (*~20% or more)**

a. Coal

b. Petroleum

c. Natural Gas

d. Nuclear

e. Hydroelectric (dam)

f. Renewables (specify) _____

g. Other (specify) _____

**6. For the main* electricity sources, how much of the feedstock (coal, petroleum, natural gas, renewable fuels) is imported from another country?**

a. 0%-25%

b. 26%-50%

c. 51%-75%

d. 76%-100%

**7. Approximately what percentage of the main* source(s) of your electricity are imported from another country? Check all that apply. (*~20% or more)**

a. 0%-25%

b. 26%-50%

c. 51%-75%

d. 76%-100%

**8. Approximately what percentage of your electricity meters have two-way communication (so-called, smart meters)?**

a. 0%-25%

b. 26%-50%

c. 51%-75%

d. 76%-100%

**9. What the non-technical losses for transmission and distribution?**

a. 0%-25%

b. 26%-50%

c. 51% or more

**10. Can a building owners are able to integrate distributed energy and microgrids?**

Yes: What is the approximate percentage of owners who have?

a. 0%-25%

b. 26%-50%

c. 51% or above

No: Why not?

a. Utility regulatory policy

b. lack of financing

c. other

**11. Do you have a smart streetlight program?**

Yes

No

## WATER

**12. Are there areas of the city without running water?**

Yes: What is the approximate percentage?

a. 0%-25%

b. 26%-50%

c. 51% or above

No

**13. Of those with running water access, how often are services interrupted?**

a. Daily

b. Weekly

c. Monthly

d. Annually

**14. Does this running water meet international water quality standards (e.g., World Health Organization)?**

Yes

No

**15. What is (are) the main* source(s) of your water? Check all that apply. (*~20% or more)**

a. Groundwater

b. River outside municipal boundary

c. River inside municipal boundary

d. Melted icepack from mountains

e. Lakes f. Desalination

f. Recycled rainwater

g. Recycled greywater

h. Other (specify) _____

**16. Approximately what percentage of the main* source(s) of your water are imported from another country? Check all that apply. (*~20% or more)**

a. 0%-25%

b. 26%-50%

c. 51%-75%

d. 76%-100%

**17. In case of a drought, are there water reserves?**

Yes: What type of reserves are these? Please specify. _____

No

**18. Approximately what percentage of your water meters have two-way communication (so-called, smart meters)?**

a. 0%-25%

b. 26%-50%

c. 51%-75%

d. 76%-100%

**19. What are your non-technical losses water losses?**

a. 0%-25%

b. 26%-50%

c. 51% or more

## AIR QUALITY

**20. Does your air quality consistently** meet international standards for air quality (e.g., World Health Organization)? (** is greater than 90% of the time)**

Yes

No: Are there special considerations at different times of day?

Please specify. _____

**21. What air pollutants are of greatest concern?**

a. SOx

b. NOx

c. PM 10

d. PM 2.5

e. Other (specify) _____

## WASTE

**22. What do you do with your waste?**

a. Renewable electricity resource

b. Recycle

c. Landfill

d. Dumping

e. Gasification

f. Incineration

g. Open field burning

h. Other

**23. Do you process waste-water?**

Yes: Approximately, what percentage to you process?

a. 0%-25%

b. 26%-50%

c. 51%-75%

d. 76%-100%

No

## COMMUNICATIONS

**24. What are the primary technology platform(s) used to deliver communications access to the majority of your city (choose all that apply)?**

a. Optical fiber

b. Wireless broadband (including 4G LTE, Wi-Fi, and Wi-Bro)

c. Satellite

d. Coaxial cable

e. Other (specify)_____

**25. What percentage of your city is covered by communications (whether wireless, wireline, satellite, etc.)?**

a. 0%-25%

b. 26%-50%

c. 51%-75%

d. 76%-100%

**26. Of those with access to communications infrastructure, how often are there outages?**

a. Daily

b. Weekly

c. Monthly

d. Annually

**27. Regardless of technology platform, what percentage of your city's population has access to broadband connectivity (broadband defined as available speed of at least 25 Mbps)?**

a. 0%-25%

b. 26%-50%

c. 51%-75%

d. 76%-100%

## INDUSTRY/ECONOMIC

**28. What is (are) the biggest industry (industries) that drive(s) the economy of your city? Check all that apply.**

a. Agriculture

b. Manufacturing

c. Tourism

d. Information and Technology (IT) & Telecommunications

e. Retail

f. Finance

g. Media & Entertainment

h. Government

i. Natural resource extraction (e.g. mining, oil, gas)

j. Education

k. Other (specify) _____

**29. Where does majority of your city's food come from (choose all that apply)?**

a. Overseas

b. Domestic

c. over 1,600 km (~1,000 mi) away

d. up to 1,600 km (~1,000 mi) away

e. up to 800 km (~ 500 mi) away

f. up to 400 km (~250 mi) away

g. up to 200 km (~125 mi) away

**30. Do you have any e-citizen services (e.g., online customer interfaces for energy, water, waste pickup and healthcare)?**

Yes: What sectors are included in these services?

List all _____

No

## STRATEGIC PLANNING

**31. Is (are) there a long-term strategic vision(s) for your city for any of the discussed services/sectors (e.g., transportation, electricity, water, and communications)?**

Yes: What sectors are included?

List all _____

No

**32. For those with strategic visions, is (are) there an implementation plan(s) and/or a road map(s)?**

Yes: Is it publicly available?

Describe where available _____

No

**33. For those with strategic visions an implementation plan(s) and/or a road map(s), who drafted the documents?**

Specify relevant ministry/organization contact _____

**34. For those with strategic visions an implementation plan(s) and/or a road map(s), is there an implementation budget?**

Specify relevant ministry/organization and $USD value equivalent _____

**35. Are you working with an international organization on a smart cities initiative?**

Yes: Please specify. _____

No

**36. Do you have a smart cities definition?**

Yes: Please specify. _____

No

## SECTION 2: IDENTIFYING THE ISSUES

What are your city's top priorities for development and/or areas of concern, within the categories listed below? *Please check categories of concern and add comments, if any.*

* Resilience in this context means the ability to recover from service interruptions and/or system failure.

| TRANSPORTATION | COMMENT(S) |
|---|---|
| __ Breadth of access | _____ |
| __ Cost | _____ |
| __ Mass transit | _____ |
| __ Congestion | _____ |
| __ Environmental impact | _____ |
| __ Safety | _____ |
| __ Resilience* | _____ |
| __ Traffic control systems | _____ |
| __ Autonomous vehicles | _____ |
| __ Other | _____ |

| ENERGY | COMMENT(S) |
|---|---|
| __ Breadth of availability | _____ |
| __ Consistency of supply | _____ |
| __ Cost | _____ |
| __ Environmental impact | _____ |
| __ Resilience* | _____ |
| __ Renewable Electricity | _____ |
| __ Renewable Fuels | _____ |
| __ Storage | _____ |
| __ Smart Grid | _____ |
| __ Other | _____ |

| **BUILDING & HOUSING** | **COMMENT(S)** |
|---|---|
| __ Supply | _____ |
| __ Cost | _____ |
| __ Structural & system integrity | _____ |
| __ Transportation access | _____ |
| __ Utility access | _____ |
| __ Energy efficiency | _____ |
| __ Environmental Impact | _____ |
| __ Other | _____ |

| **WATER** | **COMMENT(S)** |
|---|---|
| __ Availability | _____ |
| __ Cleanliness/ Quality | _____ |
| __ Cost | _____ |
| __ Efficiency | _____ |
| __ System maintenance | _____ |
| __ Metering | _____ |
| __ Recycling | _____ |
| __ Resilience* | _____ |
| __ Integration of water, sanitation & flood control | _____ |
| __ Other | _____ |

| WASTE | COMMENT(S) |
|---|---|
| __ Disposal | _____ |
| __ Cost | _____ |
| __ Efficiency | _____ |
| __ System maintenance | _____ |
| __ Metering | _____ |
| __ Recycling | _____ |
| __ Resilience* | _____ |
| __ Integration of water, sanitation & flood control | _____ |
| __ Other | _____ |

| AIR QUALITY | COMMENT(S) |
|---|---|
| __ Cleanliness/ Quality | _____ |
| __ Pollutants of Concern | _____ |
| __ Monitoring System(s | _____ |
| __ Other | _____ |

| URBAN MANUFACTURING | COMMENT(S) |
|---|---|
| __ Facility availability | _____ |
| __ Logistics | _____ |
| __ Utility services | _____ |
| __ Market access | _____ |
| __ Labor force access | _____ |
| __ Regulatory environment | _____ |
| __ Worker housing | _____ |
| __ Available technology | _____ |
| __ Other | _____ |

| **URBAN FARMING** | **COMMENT(S)** |
|---|---|
| __ Land availability | _____ |
| __ Vertical farming | _____ |
| __ Hydroponics | _____ |
| __ Water use | _____ |
| __ Other | _____ |

| **SECURITY** | **COMMENT(S)** |
|---|---|
| __ Food/clothing/shelter | _____ |
| __ Job Security | _____ |
| __ Economic Security | _____ |
| __ Street crime | _____ |
| __ Water | _____ |
| __ Energy | _____ |
| __ Environmental (e.g. clean air) | _____ |
| __ Terrorism | _____ |
| __ Other | _____ |

| **ADDITIONAL CATEGORY(IES)** | **COMMENT(S)** |
|---|---|
| __ Other | _____ |
| __ Other | _____ |
| __ Other | _____ |

SmartCitiesCouncil
LIVABILITY | WORKABILITY | SUSTAINABILITY

## NAME OF U.S. COMPANY
Smart Cities Council LLC

## WEB SITE
www.smartcitiescouncil.com

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**Over 40,000 smart city practitioners** have downloaded the Council's *Smart Cities Readiness Guide*

**Over 1000 delegates** attended the Council's S*mart Cities Week* which is now in its second year – September 26-28 2016 in Washington, DC

**Over 600 smart city practitioners** have attended *Readiness Workshops*

Over 100 cities and utilities have received *Readiness Advisory Services*

## ABOUT THE SMART CITIES COUNCIL:

The Smart Cities Council is dedicated to improving the livability, workability and sustainability of the world's cities .The Council is a consortium of 60+ companies and 75+ expert advisors, including two national laboratories and 11 universities from seven countries. Together, the Council's member companies employ well over 1,000,000 people in 150+ countries. Over the past five years, they have completed more than 10,000 smart city projects all over the world.

## DESCRIPTION OF PRODUCTS AND SERVICES:

The Council publishes the sector's largest newsletter and hosts the sector's most popular website which features the largest source of free smart city tools, resources and case studies, including the Smart Cities Readiness Guide and Smart Cities Financing Guide. The Council provides advisory services to cities, companies and utilities about cities becoming more livable, workable and sustainable.

# APPENDIX E

## ACKNOWLEDGMENTS

*A project of this complexity could not have been successful without numerous collaborators, we'd like to thank the following people and organizations for their inputs, feedback and tireless work and guidance:*

RACHAEL CROFT, INTERNATIONAL TRADE SPECIALIST, GLOBAL MARKETS,
FOR HER COUNTLESS HOURS IN MAKING THIS PROJECT A SUCCESS

ALL OUR GLOBAL MARKET U.S. AND FOREIGN SERVICE TEAMS WHO'VE PROVIDED
VALUABLE INPUTS FOR THIS DOCUMENT AND FOR THEIR WORK IN THE FIELD

INDUSTRY & ANALYSIS SECTOR LEADS AND LEADERSHIP

OUR U.S. DEPARTMENT OF COMMERCE COLLEAGUES FOR THEIR
PATIENCE AND SUPPORT DURING THIS PROJECT

THE SEVEN U.S. ORGANIZATIONS WHO PROVIDED PAID SHOWCASE PAGES WHICH
SUPPORTED THIS PUBLICATION: AECOM, AT&T, CITI, GLOBAL FUTURES GROUP,
INNOVARI, MICROSOFT AND 360 WATER

OUR ITA STRATEGIC PARTNERS: SMART CITIES COUNCIL AND GLOBAL FUTURES GROUP

BROOKINGS METRO FOR THEIR VALUABLE INPUTS ON URBANIZATION TRENDS

MCKINSEY FOR THEIR VAST KNOWLEDGE ON INFRASTRUCTURE AND URBANIZATION

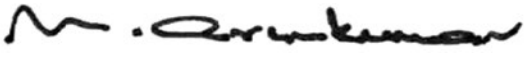
NEW CITIES FOUNDATION FOR THEIR RECENT HANDBOOK ON URBAN INFRASTRUCTURE FINANCE

U.S. TRADE AND DEVELOPMENT AGENCY FOR THEIR LEADERSHIP IN THE SMART CITY SPACE

OUR U.S. GOVERNMENT COLLEAGUES AT USAID AND U.S. TREASURY

THE MULTILATERAL BANKS (NOTE: MUCH OF THEIR ACCESS TO
CAPITAL SECTION CONTENT WAS FROM THEIR WEBSITES, OBTAINED DURING APRIL 2016)

AND A THANK YOU TO AMERICAN COMPANIES AND WORKERS EVERYWHERE
FOR YOUR INNOVATION, LEADERSHIP AND PASSION.



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Assistant Secretary of Commerce for Global Markets
& Director General of the U.S. and Foreign Commercial Service

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Senior Advisor, Global Markets,
Urbanization & Infrastructure

Smart Cities

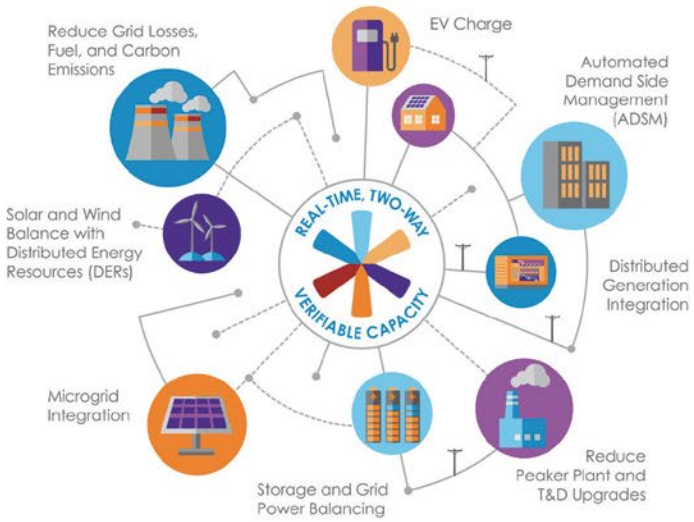
INNOVARI

# INNOVARI HELPS UTILITIES INTEGRATE AND BALANCE CLEAN ENERGY RESOURCES FROM THE GRID'S EDGE

*To ProvideCleaner, More Affordable, and More Reliable Power*

A smart city needs robust communications, but requires smart energy. Meaning, solid partnerships between the city and the utility are critical. And as governments and businesses look to add clean, distributed energy resources (DERs) to the grid's edge, Innovari is helping utilities reliably and predictably harness these resources to ensure cleaner, more affordable, and more reliable power for all community stakeholders.

## INNOVARI OPTIMIZES THE POWER GRID TO ENABLE SMARTER CITIES




### Integrating the Grid's Edge

Innovari partners with utilities to improve grid intelligence, out to the very edge of their distribution networks. This means utilities can automate and control cleaner energy resources – including renewables, distributed solar, energy storage, and EV charging stations – to make these assets a real and reliable part of the community's generation mix. Now that's smart.

### The Interactive Energy Platform

It starts with our Interactive Energy Platform (IEP), which helps utilities transform their cities, communities, and commercial and industrial (C&I) end-use customers into partners. The IEP leverages advanced communications and controls to securely connect customer-building load to the grid so utilities can unlock clean, affordable capacity without building power plants or updating their infrastructure. From here, utilities can layer additional edge-of-grid resources – like solar, storage, and emerging DERs – into the IEP to improve the customer experience and optimize the energy system.

### Improving How the World Uses Energy. One City at a Time.

We work with utilities in cities across the U.S., Latin America, India, Eastern Europe, and the Middle East. By providingutilities with real-time, two-way verifiable, and closed-loop control out to the grid's edge, we're enabling the future grid today and improving how the world uses energy. And it all starts with smarter cities.

### About Innovari

Innovari's Interactive Energy Platform (IEP) unlocks affordable, generation-quality capacity from the grid's edge, helping utilities shift capital from higher-risk generation assets into needed distribution investments – while transforming customers into partners. The IEP provides two-way, verifiable, closed-loop control over edge-of-grid resources – including customer building load, renewables, distributed generation, and storage – helping balance and optimize the evolving distribution grid for cleaner, more affordable, and more reliable power. The IEP enables utilities to provide customers with more robust products and services at the grid's edge. It reduces risk and improves utility financial performance. And it all starts with investments in customer partnerships.

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**INNOVARI.com**


# EMPOWERING CITIES AND CITIZENS

We are living in the age of cities. By 2050, 70 percent of the world's population will live in cities—up from just over 50 percent today and an additional 2.7 billion people. As urbanization increases, city leaders must try to meet ever-evolving citizen needs and demands while also facing shrinking revenues, budget cuts, aging citizens, outdated infrastructure, and rigorous regulatory requirements, as well as the cybersecurity and privacy concerns that accompany digital transformation.

## Transforming Cities

Currently 3.5 billion people live in cities; more than 6 billion people will live in cities by 2050.[1]

Cities are responsible for 80 percent of the world's energy consumption and 75 percent of carbon emissions.[2]

More than 60% of citizens of smart cities will have full access to eServices (ePayments, eExchange, eSharing, etc) in the next 10 years.[3]

Visit: www.microsoft.com/citynext

## Microsoft CityNext

Microsoft helps cities address these challenges through Microsoft CityNext, a smart city initiative that takes advantage of our extensive Microsoft Partner Network and 30 years of experience in empowering cities worldwide. Along with our partners, we offer more than 1,000 technology solutions and successful educational and entrepreneurial programs. We also work with our partners to deliver trusted cloud technologies as part of our commitment to security, privacy and control, compliance, and transparency. By harnessing the power of safe and secure cloud computing, cities can drive innovation and build new digital services that benefit their citizens.

## CityNext Verticals and Solutions

**Digital Cities – Citizen Services**
We help cities transform their infrastructure to innovate services and solutions that put people first. Working with CityNext and our partners, digital cities can provide citizen portals and support services, data dashboards, and virtual town hall meetings—all designed to deliver more efficient and effective citizen services and enable better engagement between citizens and city government.

**Safer Cities – Intelligence-Led First Response**
Microsoft's CityNext initiative and our partners can help make cities safer with solutions for neighborhood, emergency, judicial, and prison management. These solutions offer better analytics and insights, improved safety, and faster incident response. By using body-worn cameras, in-vehicle cameras, and CCTV systems, cities can deliver video storage, analytics, archival, and redaction capabilities that address the fast-growing intelligence requirements of first responders.

**Healthier Cities – Population Health Management**
Working through our partners, we can help cities improve their health with comprehensive solutions that include population health, primary and remote care, case management, and social benefits administration. As a result, citizens can lead more fulfilling lives and contribute more to the well-being of their communities. Solutions for healthier cities also address the growing mismatch between the supply of care providers and the number of patients who need care for chronic health issues and non-communicable illnesses, such as mental health, diabetes, hypertension, COPD, alcoholism, and obesity.

**Educated Cities – Connected Campus Experiences**
Microsoft and our partners can help cities improve education operations, analytics, research, learning systems, and school and campus administration with solutions that can help schools be more innovative and deliver cost-effective services and, ultimately, better learning outcomes. Our educated

cities solutions can also increase the efficiency of campus services, reduce costs, and provide actionable insights to school administrators, faculty, and students.

**Sustainable Cities – Building Energy Management and Traffic and Transit Management**

To help cities improve sustainability, Microsoft CityNext and our partners offer solutions for improving energy, building management, transportation, resource efficiency, and ecosystem services. For example, smart building solutions enable building managers to analyze data from multiple systems and sensors in order to drive energy efficiency, significantly reduce operating costs, and optimize security systems. We also work with our partners to offer transit and traffic management solutions for public, private, bus, rail, and air. These solutions feature video capture, route planning, ticketing, payment, open data, and other capabilities. As a result, cities save time, gain productivity, and produce fewer emissions.

## Empowering Cities to Realize What's Next

Move forward with Microsoft CityNext. It can build a bridge for your city to start from where you are today, leverage existing IT infrastructure, and advance toward achieving what's next—all at your city's own pace. Microsoft CityNext empowers cities to become more efficient, safer, healthier, educated, and more sustainable places to live and work.

## Engage. Empower. Optimize. Transform.

Microsoft CityNext empowers more sustainable, prosperous, and economically competitive cities—using a simplified approach. CityNext helps cities unlock their potential by delivering innovative digital services that can help citizens readily access the services they need. By tapping into the CityNext portfolio, cities are able to deploy real-time solutions that can interoperate with and improve on their legacy IT investments.

**Microsoft CityNext solutions can help you:**

- **Engage your citizens** through the use of connected mobile services to better understand citizen needs and increase reach, participation, and satisfaction through the development of new citizen experiences.
- **Empower your city employees** with cloud-enabled, role-specific applications to increase cross-team collaboration, enabling the delivery of new citizen experiences with greater productivity and efficiency.
- **Optimize your city operations** and infrastructure by connecting systems, data, and people across departments to make information more accessible and services more affordable.
- **Transform your city** by taking advantage of the cloud and data for actionable analysis and deep insights to innovate and create new digital services that benefit society, provide transparency, and encourage better citizen participation.

"Thanks to our alliance with Microsoft, we'll be able to ... break new ground in civic innovation and technological excellence."

Carlos Gimenez, Mayor, Miami-Dade County

See how cities are moving forward at www.microsoft.com/citynext

**Key supporting solutions**

**Digital Cities**
- Tax and Revenue
- Social Analytics
- Open Data
- Tourism Portals

**Safer Cities**
- Neighborhood Management
- Video Management
- Emergency Management

**Healthier Cities**
- Population Health Management
- Remote Care and Case Management
- Primary Care

**Educated Cities**
- School and Campus Administration
- Learning Systems
- Analytics and Research
- Devices, Mobility, and Apps for Learning

**Sustainable Cities**
- Traffic Management
- Transportation Safety
- Smart Grids
- Smart Buildings
- Waste Management

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OM360

*Bringing the water and wastewater industry full circle*

Certified WBENC Women's Business Enterprise

## INDUSTRY: Water and Wastewater

### Customized Technology Based Training Solution

**What we do:**

360water, Inc. creates customized online training for water and wastewater facilities. Knowledge capture and knowledge transfer is our core competency. We target operation and maintenance information and critical skills your staff need to know. Our customized courseware enhances staff efficiency, optimizes safety and is the best solution for lowering risk, reducing costs, and meeting customer service levels.

The OM360 online training tool is an effective technology solution to overcoming challenges faced by the water and wastewater industry. Our courseware is sophisticated yet easy to use.

**Challenges:**

- Equipment failure
- Inconsistent training on equipment covering start-up procedures, proper operation, and maintenance
- Staff Alignment: inconsistent workplace practices
- Staff Turnover: loss of talent when staff leave

**Solutions:**

- Standard, uniform, and consistent training available at all times
- Increase staff competency and improve workplace skills
- Eliminate information silos and share information
- Create accountability in the workplace
- Preserve institutional knowledge when staff leave
- Capture and transfer plant knowledge to new hires
- Meet State regulatory and OSHA requirements
- Maximize efficiency and reliability of operations and maintenance procedures

**Applications:**

- Customized Operation & Maintenance training specific to facility assets
- Spill Prevention Control & Containment
- Integrated Contingency Plans
- HMI—Human Machine Interface
- Asset Management
- SCADA
- Safety
- Collections
- Distributions
- Employee Orientation

U.S. COMMERCIAL SERVICE

# DISCOVER GLOBAL MARKETS

## BUSINESS FORUM SERIES 2016

## BUILDING SMART CITIES

**CHICAGO, IL • NOVEMBER 1–3**

Join the U.S. Commercial Service and the Illinois District Export Council for *DISCOVER GLOBAL MARKETS*: Building Smart Cities and transform market potential to market success.

### Meet One-on-One with U.S. Commercial Diplomats

Whether for new export opportunities, help in overcoming challenges, or general questions, pre-schedule meetings with U.S. commercial diplomats from key markets such as:

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- Canada
- China
- Colombia
- Denmark
- Germany
- India
- Kenya
- Korea (South)
- Mexico
- Peru
- The Philippines
- Singapore
- Sweden
- UAE
- United Kingdom

### Worldwide Smart City Development Opportunities

At *DISCOVER GLOBAL MARKETS*: Building Smart Cities, attendees will:

- Learn about 21st century infrastructure projects—and how to build the strong partnerships needed to win business.
- Understand the demand for new technologies that improve standards of living, create "showcase cities," increase efficiency, and promote cybersecurity.
- Explore green technologies and disaster mitigation to make cities more sustainable.

### What to Expect

- Pre-scheduled one-on-one meetings with U.S. commercial diplomats who specialize in multiple industries related to smart cities
- Key trends and defining characteristics of smart sities
- U.S. government resources and advocacy
- Multiple networking opportunities

### Visit our Website for the Latest Details!

***bit.ly/dgm2016smartcities***

**Event Dates**
November 1–3, 2016

**Location**
Swissôtel Chicago
323 East Wacker Drive
Chicago, IL 60601

**Benefits of Registering**

- Access to all conference sessions.
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- Networking lunches, breaks, and receptions.
- Conference materials.

**For More Information**

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1512-02-07-0